

# **COST BENEFIT ANALYSIS**

**in Town Planning**

**A CASE STUDY OF  
CAMBRIDGE**

**By Nathaniel Lichfield**

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This booklet has been published by the Cambridgeshire and Isle of Ely County Council as a contribution to improving and developing the science of town planning.

The work involved in this Study was undertaken during the lifetime of the former Cambridgeshire County Council and it should be clearly understood that the findings and conclusions which follow are those of the author and do not in anyway commit the Cambridgeshire and Isle of Ely County Council.

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## Preface

In 1956, I put forward the concept of the Planning Balance Sheet, that is the application of cost-benefit analysis techniques in planning and development as a means of aiding and clarifying planning decisions. Since then, I have been attempting to mature the methodology for everyday use in planning offices. The attempt is made by case study, in parallel with development of the theory. This is one such case study. Its main aim is to demonstrate a technique, in sufficient detail for its methodology to be understood. Planning Balance Sheets in practice would be simpler.

Cambridge presents a good opportunity. I have known its planning problems for many years. The County Planning Department was more than co-operative. Its planning documentation is outstanding. And the case offered a great challenge, for if the Planning Balance Sheet could prove of use in a problem of much complexity and controversy, then its strength would be demonstrated. But, I must emphasize, the material used dates mostly from 1962/4 and must therefore not be taken as representing planning proposals or thinking in Cambridge in 1966.

The study was undertaken as part of on-going research in the subject, in the Department of Town Planning, University College London. It was made possible by a grant from The Resources for the Future Inc. of Washington D.C., who invited me to present the findings of the study in another context at a conference organized by their Committee on Urban Economics at New York University, N.Y., in 1964. This earlier version appears in the published conference proceedings "Spatial Externalities in Urban Public Expenditures", The Public Economy of Urban Communities, Ed. Julius Margolis (Resources for the Future Inc. 1965).

My warm thanks are due to Resources for the Future Inc., and also to the Head of the Department of Town Planning, University College London, Professor The Lord Holford. In addition, I must thank Mr. W.L. Waide, former County Planning Officer, without whose encouragement the study could hardly have been started; and Mr. B.H. Mellor and Mr. N.B. Ayling, current County Planning Officer and Deputy, without whose encouragement it could not have been completed; members of the County Planning Department for great help during the preparation of the study and for preparing and handling the publication; Mr. E.F. Mills and Mr. R. Stafford Smith, Director and Chief Surveyor respectively of the University of Cambridge Estate Management Advisory Service; Mr. J.F.Q. Switzer of the University Department of Land Economy; Mr. M. Gandy for his great help on the complex valuations; and Messrs. R. Travers Morgan and Partners, the County's Traffic Consultants.

But, of course, the study is my responsibility and I must take the blame for any shortcomings. That they exist I am very well aware. But I hope that the study will be accepted as a step along a difficult but worthwhile road of travel.

N. LICHFIELD  
March, 1966

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## Chapter 1

# THE BACKGROUND

### BACKGROUND

Cambridge has world fame on at least three counts. The University is both ancient and of the highest attainments. Extensive collegiate buildings offer a model in form. And, in the centre, collegiate buildings and the others mingle together to form that unique blend which stamps Cambridge as a university town rather than a town with a University.

But Cambridge deserves fame on yet another count. For some fifteen years the Cambridgeshire County Council as local planning authority has made noble attempts to maintain the university character of the town, attempts spurred on by the fate of Oxford. The first concrete proposals for achieving the aim were published in the Holford Report, 1950. (1) This was followed by the official County of Cambridge Development Plan which by and large embraced the Holford proposals. The policies have been adhered to since, with the aid of the central government departments concerned, so that some 15 years after the Holford Report success rather than failure can be attributed to the authorities in a most difficult operation.

The operation has not been without its opponents and battles. These have come not so much from the private sector as from the public, in the guise of the City Corporation and also the University of Cambridge. The City, which covers most of urban Cambridge, is a Borough so that the County is the local planning authority. And the University has joined battle to produce that height of controversy which in England seems to be found only in academic retreats.

The controversy has raged continuously since the initial onslaught by the University on the Holford Plan in 1950. There have been endless skirmishes on matters of detail as the opportunity arose, and three major pitched battles. These have taken place on the occasions when the County Council has made the necessary formal submission to the Minister of Housing and Local Government for approvals of its plans: The County Development Plan itself in 1952; redevelopment proposals in 1959 for the Lion Yard Area, some 6 acres of dereliction in the city centre, which were rejected by the Minister; and again in 1962 when revised proposals for the same area were lodged as part of the statutory quinquennial review of the whole Plan.

In mid 1964 the Minister of Housing and Local Government issued his draft decision on the 1962 Inquiry, and in March 1965 the Minister issued his final decision. To a degree he has put the disputants on a new course, for he has made a decision which has been interpreted as being in the direction of the University

proposals, without by any means fully accepting them.

On these three occasions there were public inquiries, and on each occasion the inquiry was a mammoth spreading over several weeks and involving numerous lawyers, expert witnesses and officials. In these circumstances a clear cut decision was not easy to achieve. Not only are there volume upon volume of published material to consider, in plans, reports, inquiry testimonies and miscellaneous publications, but these contain a welter of conflicting and confusing verbiage. They contain arguments about, without differentiation between, the whole miscellany of factors which are to be found in land use planning literature and discussion - about aims, facts, trends, forecasts, design, planning standards, techniques, taste and assumptions for the future.

Amidst this welter it is more easy than in the typical planning controversy, where it is easy enough, for disputants to select one or other particular aspects upon which to press their case without keeping all the issues in perspective; it is more easy to avoid concentrating on the relevant.

It is in such circumstances, in the writer's view, that the technique of cost benefit analysis, adapted to the world of planning in the form of the Planning Balance Sheet, can be of particular help in marshalling the relevant considerations as an aid to a decision which can be taken in the public interest, and demonstrated to be so taken. This view stems from the following argument.

While there is no generally accepted definition of the precise role of town planning most, it is submitted, would agree that its prime objective is to ensure that change in the settlement pattern is more in the public interest than would result simply from the unplanned interplay of social, economic, and institutional determinants of land use. Put more precisely, the objective is to ensure that changes in development and redevelopment have regard to the total costs of benefits to the whole community, and to which sectors of the community would bear the cost and which enjoy the benefits. In consequence, the plan needs to be devised in order to guide development and redevelopment towards that objective.

Now while, it is submitted, planners have this aim, they have as yet no generally acceptable technique for the purpose. It is this gap which the Planning Balance Sheet aims to fill. The technique is still experimental but is steadily maturing.

The methodology of analysis has been described elsewhere, with demonstrations by case study. (2) A recapitulation of this method would be tedious for those who are already informed, but for others its omission would make the study more difficult to follow. For this reason a summary is included in Chapter 3 below, for optional reading. This is largely a re-statement of the earlier writing but includes improvements in the technique since then, improvements which have been suggested by additional experience and also from collaboration in 1961/62 with Julius Margolis, both on cost benefit analysis itself and also on the particular problem of Cambridge. (3)

A final word needs to be said on the purport of the analysis. Its approach is different from that used conventionally in reaching planning decisions on disputed issues, including Ministerial decisions. Instead of double guessing the proponents and making a decision which supports one or other, or offers a compromise, the analysis takes another tack. It visualises the completion of the alternative proposals which are advocated and, by implication, assumes that all necessary tests for feasibility (economic, financial, engineering, political) have been carried out, traces the resulting costs and benefits on the various sections of the community which are concerned, and points to the decision where the margin of total benefits over total costs would be greater, and where the incidence of benefits and cost would be equitable.

The analysis, it should be noted, points to the decision but does not necessarily produce it, for the decision does not lie with the analyst, and the Balance Sheet conclusions can still leave much room for value and political judgement. But in some cases the analysis will leave little doubt as to where a decision in the public interest would be.

Chapters 4-6 are an analysis by Planning Balance Sheet of two major alternative plans for central Cambridge which were presented to the Minister at the 1962 Inquiry. The analysis was made in 1962/64, while the Minister was reaching his decision. Chapter 7 reviews the Minister's decision in the light of the analysis.

## Chapter 2

# THE ALTERNATIVE PLANS

### ALTERNATIVE PLANS REQUIRING ANALYSIS

While the critical decision facing the Minister relates to the redevelopment of a relatively small portion of central Cambridge, the underlying issue, and the one over which the recent Inquiry has raged, is the choice between the opposing views of the County and University as to the planning of central Cambridge. On this issue the City now aligns itself one way and now the other, and while certain other views exist they are peripheral to the main contest. The analysis devotes itself therefore to a comparison of these two principal opposing Plans.

The County's views are relatively easy to interpret for they have consistently followed the Holford plan in its essentials and are very well documented (4). But even so they have required amplification and detailing in certain important respects, and the gaps have been made good by the County Planning Department and its Consultants. The University view on the other hand is not so intelligible (5). It has not prepared a comprehensive alternative plan but instead has put forward certain partial proposals when combatting the related County proposals. Furthermore, it has not always spoken with one voice, and while the line of opposition has been consistent over the years there has been wavering in particular respects, and changes of ground at successive public inquiries. It has therefore been necessary to piece together for the purpose of this analysis a "notional" University Plan. This has been achieved by defining the critical University proposals with the help of the University's advisers and then asking the County Planning Officer to show how his own plan would have to be modified were the Minister to instruct the County to adopt these critical proposals rather than its own.

As a result it has been possible to formulate two alternative plans for central Cambridge. The essential differences, and it is only with the differences that we are primarily concerned in this analysis, are now summarised.

In 1963, urban Cambridge had a population of about 95,000 people and a further 25,000 lived in a necklace of some twelve major surrounding villages. (Plan 1) Apart from its University of some 9,000 students, Cambridge has the typical characteristics of a prosperous town in rural England - mixed housing, all forms of employment and the administrative, shopping, business, entertainment and cultural services for some 300,000 people. Its service area is shown on Plan 2, with the boundaries of competing service areas. The whole region looks to London in the south for major facilities.

Plan 3 shows the Planning Authority's proposals for urban Cambridge in its quinquennial Development Plan Review of 1962. They comprise a modest

population expansion to 100,000 for the built-up area and 35,000 for the necklace villages, with a green belt to limit the growth; University expansions to the west; some expansion and redevelopment of the central core; rationalization of land use; new car parks; major improvements to the road system; and gradual redevelopment of most of the central core to modern standards, starting with the contentious Lion Yard area.

Plan 4 shows existing central Cambridge, and how the collegiate buildings almost encircle the core leaving little room for expansion. The difficulties of adapting the confined centre for a much larger supporting population have led the County, following the Holford plan, to restrict the size of Cambridge, another associated reason being its aim to perpetuate the relative dominance of the University in the town, and also to maintain the scale, density and open space structure of the town as a whole. On the other hand, the University take the view that even though the City population is kept down in number drastic change in the centre must result, for the regional support population will grow and there will be a disproportionate increase in total motor vehicle usage and spending power, leading to major redevelopment. They therefore propose large scale redevelopment of an obsolete area of mixed uses some half mile to the east to provide a new commercial centre. This area, which is known locally as the City Road area, is bounded by Newmarket Road, East Road, Parker's Piece and Christ's Pieces. It includes the existing Fitzroy/Burleigh Street shopping area. The existing centre would not be enlarged and in fact would diminish in activity, as major existing traders would be encouraged to transfer to the new centre, and new ones to become established there (Plan 4).

Since space would not be critical in the new centre, the University contemplate that the new centre and established core would together be able to support more than the 300,000 people envisaged in the County Plan. Indeed, they see advantages in so doing, for people now using Cambridge would then have a centre which could offer more services. Certain people in the service area who now do not use Cambridge because of its congestion would do so, and the higher site rents obtained in City Road would aid the financial feasibility of the redevelopment. In terms of population they are thinking of about 150,000 in urban Cambridge (not through peripheral expansion but by higher densities) and a total regional support of about 400,000 people. This, they argue, could be achieved without detriment to the character of Cambridge as a University town.

As a corollary there are opposing views on the subsidiary shopping centres. The County have forecast the impact of growing car usage and purchasing power, and they reckon that these can be satisfactorily accommodated in the existing core as expanded and redeveloped, provided they take advantage of established trends in the dispersal of retailing activity by siphoning off to existing and proposed outer shopping centres some of the convenience goods purchasing power, leaving a greater predominance in the central core of non-convenience goods. The University, however, would seek for concentration in City Road at the expense of the outer centres. These critical differences between the Plans would lead to differences in redevelopment proposals. The County Plan implies redevelopment in the whole central core over, say, 20 years, starting with Lion Yard (although the later stages

have yet to be studied in depth) and an expansion in Fitzroy/Burleigh Street shopping area and in outer centres (Plan 4). The University visualize less intensive redevelopment in the derelict Lion Yard, no redevelopment of any significance in the remainder of the central core, and a major scheme in City Road, involving transfer of trade and activities there from the central core (Plans 4 and 5).

But there is little conflict about University development itself. Having accepted major expansion to the west, the University has only modest requirements for new building in the centre. The requirements relevant to this study are for the rebuilding of existing Science Buildings, which can be carried out equally well under either Plan on the existing site west of Corn Exchange Street.

The remaining differences relate to roads and car parks. If the central core is to function in its present location it is necessary to remove unnecessary vehicles. This the County propose to do by introducing an inner relief road and other road works to direct traffic from the centre, and to discourage traffic trying to pass through by closing Magdalene Bridge to vehicles (Plan 4). These, together with comprehensive redevelopment of the major part of the central core in the years to come and the provision of car parks in the central core and on the fringes, would enable a virtually traffic free central precinct to be established. The University on the other hand oppose the inner relief road. It would run between the existing and new central cores and thus imperil their interrelated functions; and it would also interfere with College property. But they recognise that the City Road scheme would involve road works and car parks additional to those proposed in the County Plan, to accommodate the greater amount of traffic that would be generated in that area.

A final comment might help to put the two alternatives in perspective. Cambridge at the moment has two centrally sited shopping centres: a central core and a very subsidiary off-shoot in Fitzroy Street/Burleigh Street. The County visualises the continuation of this arrangement with this subsidiary centre enlarged (and outer centres developed) to syphon off some of the growth that otherwise would take place in the traditional core. The University, on the other hand, visualises the transfer of major commercial activities to City Road to embrace and enlarge the now subsidiary centre, leaving a lesser centre in the traditional core, with no major suburban extensions.

# CAMBRIDGE AND SURROUNDING VILLAGES



Scale in miles

1

2

3

4

5

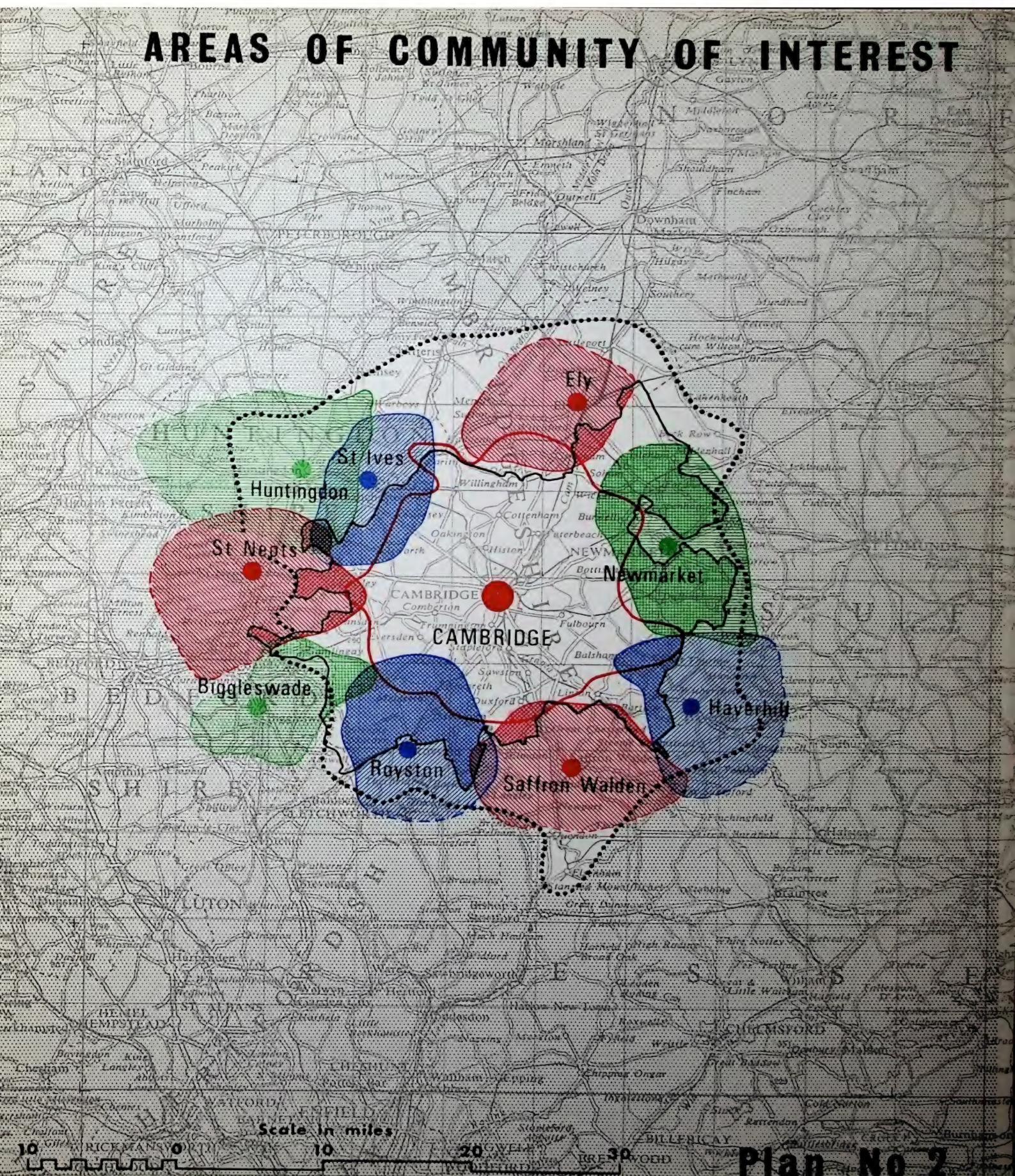
Plan No 1

# Key

## Areas assessed by field surveys

Areas looking to Market Town as Local Centres . . . . .	coloured
Area looking to Cambridge as Local Centre . . . . .	
Area looking to Cambridge as Main Centre . . . . .	
County Boundary . . . . .	

# AREAS OF COMMUNITY OF INTEREST

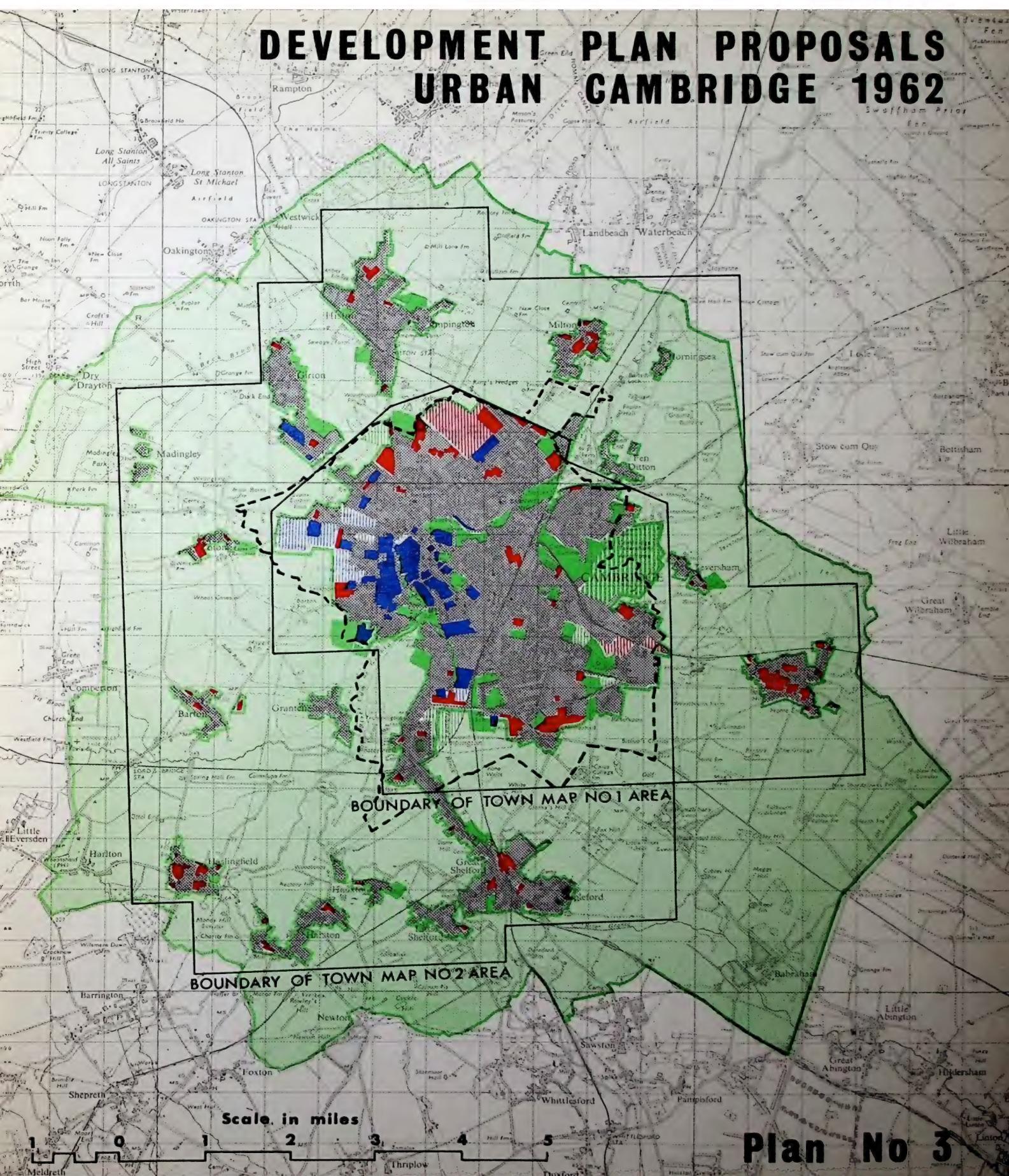


Plan No 2

## Key

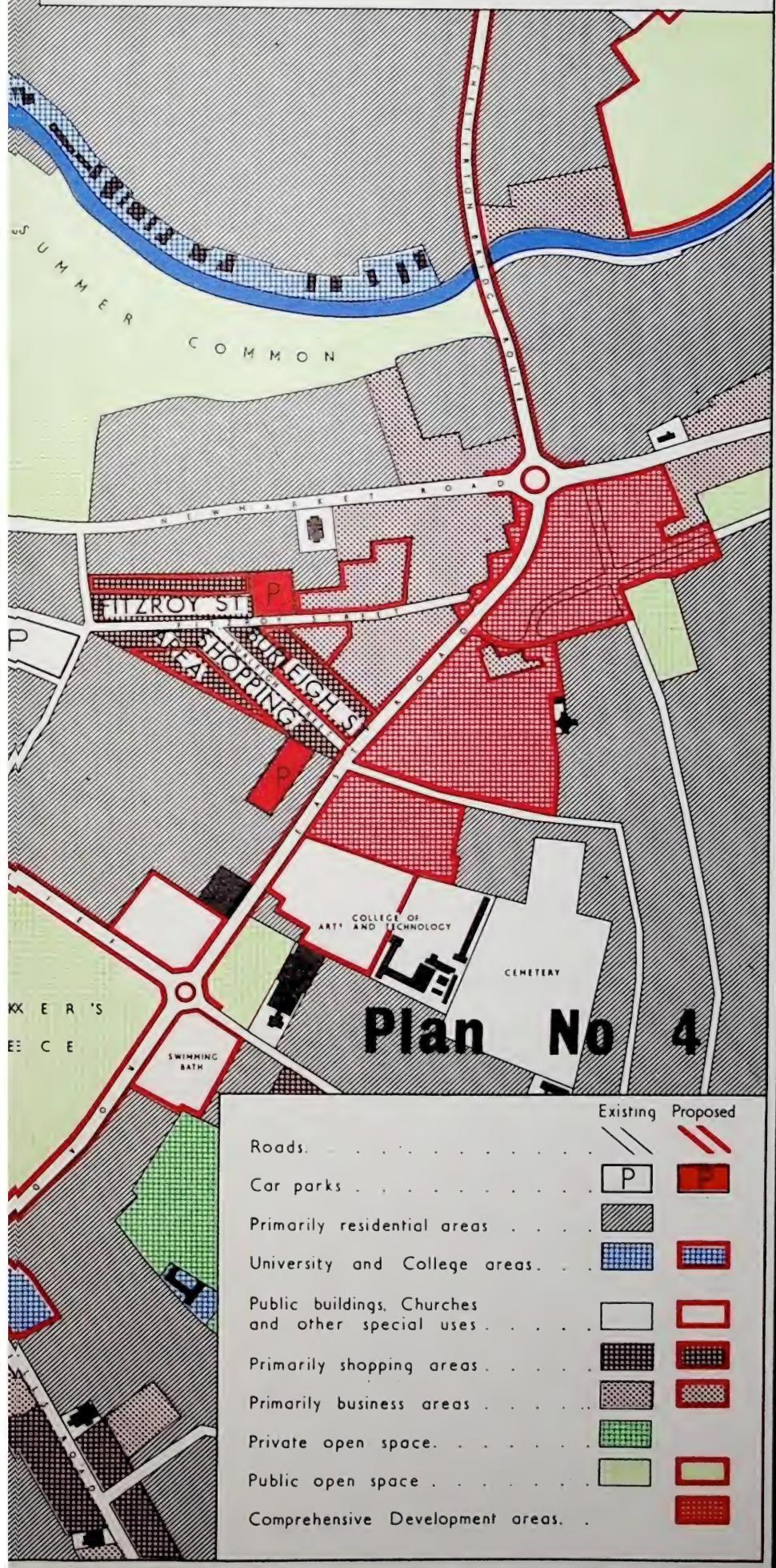
Areas of existing development 1957 . . . . .	
Areas available for development at 1957 . . . . .	
Proposed green belt . . . . .	
Areas proposed to be included for development at the quinquennial review of the plan . . . . .	
	Proposed Existing
University and college use . . . . .	
Open spaces . . . . .	
City boundary . . . . .	

# DEVELOPMENT PLAN PROPOSALS URBAN CAMBRIDGE 1962





# THE CENTRAL AREA



The Central

Areas of existing development 19

Areas available for development

Proposed green belt . . .

Areas proposed to be included i  
at the quinquennial review of the

Sub-Centres

University and college use . . .

Open spaces . . . . .

Thousand square  
space (excluding

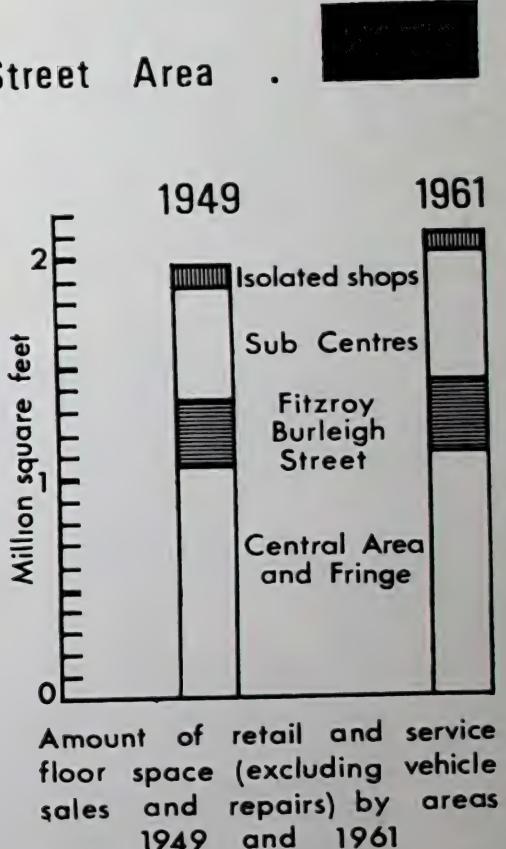
City boundary . . . . .

# Key

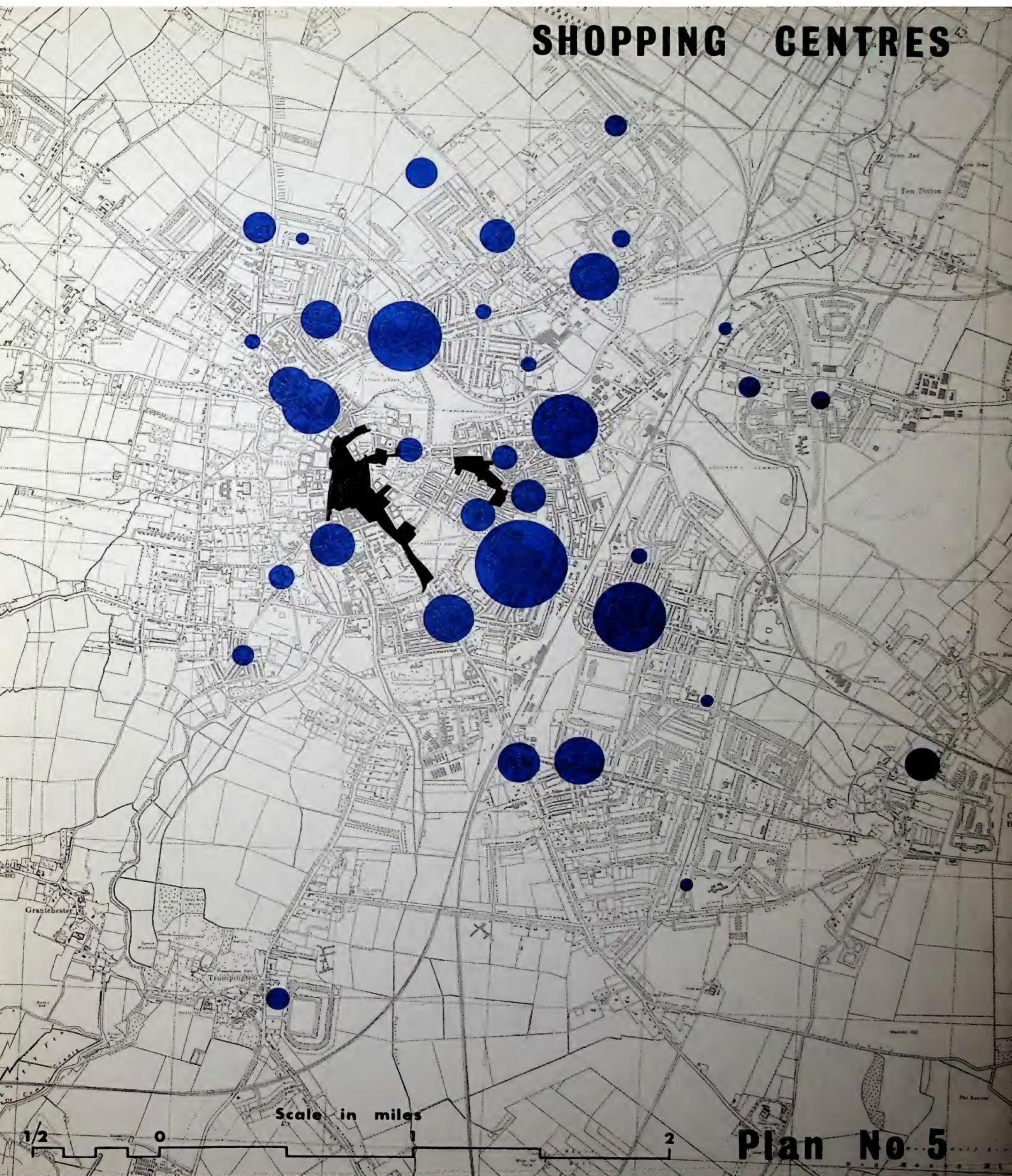
Area Fringe and Fitzroy-Burleigh Street Area .



feet of retail and service floor  
vehicle sales and repairs)



# SHOPPING CENTRES



# Key

Comprehensive Development Areas . . . . . (1-9)



Roads . . . . . . . . . (10-16)



Car Parks (excluding those in C.D.A's) . . . (17-23)



Note. numbers to be read in conjunction with Table 1

# PROGRAMME OF PROJECTS



Plan No 6

## Chapter 3

# GENERAL METHOD OF ANALYSIS

### PROGRAMME OF PROJECTS

A town plan is in essence a picture and description of the town in the future, should the changes visualised on the Plan come about. The future can be some specified date by which it is forecast all the changes will be realised; or it can be a series of dates, where the changes will mature at different times; or it can have no date, by which it is implied that no forecast is given as to when the changes will be achieved.

The town plan can thus be considered as a group of proposed, inter-related use changes, which will be produced either through new works of construction on open or already developed land, or without new works. These changes can be visualised as a series of projects, to be implemented by a variety of public and private development agencies, acting singly or in combination. The changes taken together constitute a "programme of projects".

In the two Plans in question we thus have alternative programmes of projects; in this instance there is a time scale for their implementation.

### SOCIAL ACCOUNTS OF PROJECTS

The analysis is summarised in a table, of which Table A is a model. The technique can be described by reference to Table A. First, we enumerate as sectors the various "producers" and "operators" (individuals or groups who play a part in creating and running the services to be realised from the project). These are listed vertically at the left hand side of the table against odd numbers. With each producer or operator is paired, as far as possible, the appropriate "consumers" (individuals or groups who consume the services produced) against even numbers. Since the projects under consideration constitute real estate development, the producers include current property owners who would be displaced, and the consumers the corresponding current occupiers. Each producer/operator or consumer is an "item". The number of persons in each item is shown. This is particularly relevant where there are different numbers for the alternative projects, for both total costs and benefits and averages are of interest. Where the actual number of persons is not known " $n$ " and " $n^+$ " are inserted to indicate in which scheme there are the greater or lesser number of people involved.

Each linked or associated pair of producers/operators and consumers are considered engaged in a "transaction" whereby the former produces services "for sale" to the latter. But these transactions are not confined to goods and

services directly exchanged in the market. They extend as well to indirect "transactions", for example the traffic noise "sold" to the occupier of an established house by the builders of a new traffic road nearby. Thus the table presents a set of "social accounts" summarizing all "transactions" in the project, one account for each numbered item. No transaction of concern in town and country planning should be omitted, however intangible the services produced. Its existence, incidence and, where possible, order of magnitude, all help to fill out the picture.

### COSTS AND BENEFITS

As a result of each transaction, all producers and consumers incur both costs and benefits. The costs are the value of the goods and services used to produce and operate a project (the inputs), and benefits are the value of the services provided (the outputs). Each cost and benefit is an "entry". Each might be one of three kinds. (6)

- (a) Direct or indirect, or private or social in the conventional terminology. Private relates to costs which the producer or consumer must bear and to benefits they can appropriate under current law and custom. Social relates to the diffused costs suffered by others which need not be compensated and benefits enjoyed by others for which payment cannot be exacted.
- (b) Real or transfer. Real relates to the use of real (economic) resources, that is land, men and materials; whereas transfer relates to financial resources which are simply transferred from one section of the community to another as a result of a transaction, without using up or adding to real resources. The purchase of land is an example.
- (c) Real (technological) or pecuniary. These relate in the main to changes in the value of established as opposed to new goods and services, brought about by external changes. Real costs and benefits arise where there are changes in actual quality (the occupational atmosphere of an office building when a new park is created nearby). Pecuniary changes in value arise simply because of relative changes in the supply or demand of goods and services (value of established houses when new up-to-date houses are built).

It follows that producers/operators' benefits and consumers' costs are not linked in the same way in all pairs of items. Where costs and benefits are exchanged in the market, the sale prices are the producers' benefits and the consumers' costs, and the producers' output becomes the consumers' benefits.

When there is no exchange, as in indirect costs and benefits, this none the less applies. When a public agency provides services to be paid through taxes, its benefits are the taxes, which in turn represent consumer (taxpayer) costs. But those paying taxes may not be the ones who receive the benefit, and where necessary the distinction must be made.

#### MEASUREMENT OF COSTS AND BENEFITS

It follows from the stipulation that Table A must include all transactions of concern in town planning that many entries will not be measurable in terms of the common denominator, money. They are often measurable in other terms (e.g. time, physical units) and if so the appropriate quantity is used. Where no measurement is possible with known techniques the item is an intangible and noted as such, but not therefore excluded.

Costs and benefits of producers/operators can usually be measured, even if "indirect" in the sense used here. But consumer costs and benefits often are intangibles. The approach then is to specify the utilities which are sought by the consumers, or disutilities which they seem to avoid (here termed "instrumental objectives"). Subjective judgement is then applied to forecast the extent to which the Plan will achieve the objectives.

Utilities to be sought or disutilities to be avoided can be specified for all sectors. As such they can be equated with the goals which the Plan sets out to achieve where these are stated expressly. Wherever the goals are stated only broadly, or are left unformulated, the analysis brings out the objectives which will be achieved. The decision makers can then have a grasp of what benefits the Plan will produce for the various sectors, and at what cost.

#### FORECASTING

The analysis attempts to forecast, prior to the time of decision, the difference in all costs and benefits that would accrue to each producer/operator or consumer if the project were implemented. This being the case, we compare costs and benefits which would arise "with" the project's implementation against those arising "without" undertaking the project at all. While attempts to forecast changes in current costs and benefits arising "without" investment prove difficult, we pursue the principle so far as possible.

While the model table provides only for a comparison of one proposal against another, or against the current situation, it can be extended to include two or more proposals. The comparison can be made in terms either of absolutes or differences. While it is essentially the differences which are sought, it is clearly useful to have both, for then the significance of the amount of the difference can be gauged. But often the absolutes are over-laborious to forecast whereas differences can be readily grasped, in which case differences alone are introduced. But in any

case it is desirable to attempt an estimate of the total real capital investment involved.

In forecasting, time must be allowed for in various ways. Development cannot be carried out quickly so that interest on locked up capital must be added. Assets, whether existing or proposed, have a limited life and must therefore be amortized. Revenue streams must be discounted back to values at a particular time, normally that time when the analysis is made. For all this discount rates must be adopted. The aim is that each transaction should be in terms at present worth of cost and benefit.

### ACCOUNTANCY RULES

When making entries in the Table we observe the following accounting rules :-

1. In tracing repercussions, benefits and costs are kept separate in the respective columns. Negative benefits are not treated as costs, nor negative costs as benefits.
2. Capital and annual benefits and costs are kept separate, the former being those which accrue once for all, and the latter those that will continue.
3. Where measurement of benefits or costs in money, time or physical terms is possible, figures are inserted in the Table. When a measurable entry has not been measured, an "M" or "T" or "P" is used instead of figures, to indicate that money, time or physical units would be employed of a capital nature. An "I" (intangible) indicates that an entry is not measurable. Small "m", "t", "p" or "i" entries apply to annual flows. Subscripts distinguish the different "M", "T", "P" or "I" (or "m", "t", "p" or "i") entries. The ordering of numbers progresses through each of the items in turn. The same number is used for a particular entry if that entry is translated from capital to annual terms or vice versa or is the same in a producers and consumers item.
4. Where an increase or decrease in a "M", "T", "P" or "I" item can be forecast, but not the amount of change, a (+) or (-) sign is used. For clarity no sign indicates positive (e.g. M) and a bar indicates negative (e.g. M).
5. When the costs and benefits of certain producers and

consumers are covered by those of others, an "E" (elsewhere) and cross references are shown in the Remarks Columns. This avoids double counting. Double counting in this context is distinguished from double entry. This exists as in all accounts, the benefit to one being a cost to another.

Since each line for any item can contain costs and benefits which are not in figures and therefore cannot be arithmetically reduced, a "Remarks Column" shows the algebraic reduction. For example it will indicate which costs and benefits are greater (< and >), where they are equal ( $\equiv$ ), where the difference is not known (N/C) and where probabilities can be seen (Prob.). The conclusion is shown in the next column by indicating which scheme has the net advantage for that particular entry, and where there is uncertainty (N/C). In all this, one important rule is followed - one particular scheme is always compared with the other, so that differences always show in favour or against that particular scheme. It follows that there is not much hesitation in making interpersonal comparisons.

Where any social account contains more than one entry, we "reduce" the account to its simplest terms, still keeping costs and benefits separate. This reduction is accomplished by:-

1. Ignoring E entries.
2. Eliminating entries containing costs and benefits common to all alternatives.
3. Adding the entries algebraically, offsetting negative against positive, but keeping benefits and costs distinct.
4. Capitalizing annual entries or, more usually, converting asset values to their annual equivalents, to achieve a common form.

Where all entries are in money terms the result is one figure for costs and one for benefit in each item. Even where M, T, P or I entries are shown, it might be possible to see the direction in which differences lie, and perhaps to gauge the order. The same procedure is therefore followed as described under the remarks column.

When completed, Table A thus provides a statement of the reduced social accounts for the alternative proposals in the project.

#### SUMMATION

If Table A contains many unmeasured entries its implication will be complex. To simplify, a summation table is prepared, of which Table B is the

model, to which are transferred the reduced entries of Table A.

Table B itemizes all producers/operators and consumers in Table A, on the right and left sides respectively as before, but with a regrouping of items in order to simplify the conclusions. Against each item is shown not simply the reduced entries of Table A, but the differences between them, keeping benefits and costs separate. The differences are then netted algebraically in a third column, showing the "net" situation. In both striking the difference in Table A for transfer to Table B, and in netting in Table B, positive costs and negative benefits are shown as negative, and negative costs and positive benefits are shown as positive.

The net column in Table B is the ultimate reduction of the social accounts. It facilitates a comparison of projects in terms of their benefits and costs, and incidence of benefits and costs. But, it should be noted, by eliminating entries with costs and benefits common to alternative schemes, the range of costs and benefits in Table B is less than that shown in Table A.

### CONCLUSION

The summation, supported by Table A, provides the analysis on which the decision maker can act. It may point quite clearly to a conclusion, or may leave room for value judgement. If so, it will provide a basis for the value judgement.

But the analysis can give further help. For example, it would enable the decision makers to pick out elements of the design which are high in cost or low in benefit, or those sections of the community which would bear the costs and receive the benefits. In consequence they could, if they wish, ask for review of these design elements with a view to reducing costs and increasing benefits, or to redistributing the burden and benefit. If they preferred to adhere to the design, the analysis could provide the basis for considering some subsidy, or channelling some reimbursement, to those who were bearing a particularly large share of the burden. In all of these and similar moves, they would act against a full picture of the whole project, and could see the marginal effect of changes in any element of the project.

### VALUE JUDGEMENT

It remains to emphasise that simply because the analysis must, by definition, concern itself with costs and benefits which cannot be measured, it must therefore involve a great deal of value judgement - for example, in selecting instrumental objectives (is proximity of a dwelling to a traffic road undesirable for all people and therefore a cost to be minimised); in comparing the amount of intangibles in different projects to arrive at conclusions in the remarks column; in weighting entries in the reduction process; in drawing conclusions from the summation.

But, again by definition, decisions which are made without such analysis involve mighty value judgements. The decision can be improved, it is submitted, if the analysis breaks down the points of decision into the smallest possible sections, within a rigorous framework of reasoning. The scope for misjudgement must thereby be reduced.

## Chapter 4

# THE ANALYSIS

### THE PROGRAMME OF PROJECTS

It will be evident from the description of the alternative Plans in Chapter II that while the essential conflict of view relates to central Cambridge, the analysis cannot be confined to this alone. Inter-dependent proposals in other parts of the City must also be taken into account.

Following this approach, Plan 6 illustrates the relevant programme of projects embodied in the alternative County and University Plans, and Table 1 lists them. The Table shows that the projects comprise a group of interrelated redevelopment areas, roads and car parks, some of which are common to the plans and some not. For each is listed in the Table, by use, the number of properties which would be displaced, the amount of floor space by use which would be provided in new buildings, the number of cars which could be accommodated in car parks, and also the timing of each project in each of four 5 year phases.

### COMPREHENSIVE DEVELOPMENT

In the County Plan, projects 1-4 comprise the redevelopment by stages of the central core, 5 the expansion of the Fitzroy/Burleigh Centre, and 7-9 the provision of new suburban shopping centres. In the University Plan in place of these there is the modest redevelopment of a smaller area in Lion Yard without any shops (1A) and the major scheme in City Road embracing Fitzroy/Burleigh Street.

### ROADS

No road proposals have been prepared for the University Plan, but an informed view is that the difference between the road schemes is that the University Plan would need much the same road pattern to serve the general needs of Cambridge traffic, but would need to be built at a much more costly standard. The essential difference would be that the University scheme would not have the inner relief route 12, so that the existing spine road would remain, and routes 13, 14 and 15 would have extra widths, higher free flow standards, and more complex junctions to cater for the additional traffic to be generated in the City Road area.

### CAR PARKS

The difference in car parking provision is more marked. Most of the

TABLE 1

## CITY OF CAMBRIDGE

## PROGRAMME OF PROJECTS IN THE COUNTY AND UNIVERSITY PLANS WITH CURRENT AND PROPOSED USES

PROJECT	Area	Current Uses Disturbed number of properties						County Proposed Uses 1,000 sq. ft. fl. area						University Proposed Uses 1,000 sq. ft. floor area												PHASE in years
		S	O	I	R	P	M	Total	S	O	I	R	P	M	Total	C.P.	S	O	I	R	P	M	Total	C.P.		
Comprehensive Development Area																										
1. Lion Yard	7.3	52	56	4	23	4	27	166	294	78	-	105	187	52	716	750	-	-	-	-	-	26	213	750	0 - 5	
1A. Lion Yard	2.6	-	3	1	1	2	5	12	1.2	23	4	4	2	6	39	45	15	-	30	-	-	90	-	-	5 - 10	
2. Market Hill	1.2	1.8	19	2	-	6	2	-	29	123	15	-	15	-	-	153	-	15	-	-	-	10 - 15	10 - 15	15 - 20		
3. Green Street South	1.0	12	8	1	18	-	8	47	50	12	-	15	-	-	77	-	-	-	-	-	50	600	600	5 - 10		
4. Green Street North	4.0	8	2	4	152	1	4	171	95	-	-	-	-	-	95	-	-	-	-	-	1040	-	200	0 - 10		
5. Fitzroy/Burleigh Street	65.0	142	6	25	777	12	81	1043	-	-	-	-	-	-	-	-	-	-	-	-	1240	10000	0 - 5	0 - 5		
6. City Road																										
Other Centres :																										
7. Duce's	7.0	-	-	-	-	-	-	-	-	160	-	-	-	-	160	1000	-	-	-	-	-	160	1000	10 - 15		
8. Cattle Market	7.0	Not known	-	-	-	-	-	-	160	-	-	-	-	-	160	1000	-	-	-	-	-	50	500	5 - 10		
9. Mitcham's Corner	3.0	Not known	-	-	-	-	-	-	50	-	-	-	-	-	50	500	-	-	-	-	-	-	-	-		
Roads																										
10. Downing Place Extension	9	5	-	1	-	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	0 - 5	0 - 5	0 - 5		
11. Pembroke Street	1	2	3	77	-	1	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 - 5	0 - 5	10 - 15		
12. Inner Relief Road	43	4	5	171	3	6	232	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0 - 5	0 - 5	10 - 15		
13. Victoria Avenue	21	3	7	136	2	2	171	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10 - 15	10 - 15	10 - 15		
14. Chesterton Bridge - East Road	12	2	-	6	1	1	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10 - 15	10 - 15	10 - 15		
15. East Road - Trumpington Road	20	8	3	196	5	7	239	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10 - 15	10 - 15	10 - 15		
16. Brooklands Avenue Link																										
Car Parks (excluding those in C.D.A.'s)																										
17. Park Street	1.0	-	-	10	32	1	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-	450	450	0 - 5		
18. King Street	1.0	Site not determined	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500	500	5 - 10		
19. Newtown Area	0.5	Part of residential development	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	300	300	0 - 5		
20. Pound Hill	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	200	200	5 - 10		
21. Parkers Piece	1.0	Site not determined	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	750	750	0 - 5		
22. Emmanuel Road	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500	500	5 - 10		
23. Castle Hill																										

KEY: S - Shops, banks, public houses R - Residential I - Industrial  
 P - Public Buildings M - Miscellaneous  
 O - Offices

For location of reference numbers see Plan 6

car parks outside the C.D.A.'s would be common (all except 22, providing 2,700 places) as would the provision in the Lion Yard (750 in No.1 and 1A). But this apart, the County would have 1,350 in inner projects 5 and 22, and 2,500 in the suburban projects 7 - 9, as against the University's 10,000 in the City Road 6.

TABLE 'A' ANALYSIS

General Table A summarises the differences in costs and benefits which will accrue to the various sectors from the implementation of these projects. Although not comprehensive in the sense of including every single party which would be affected, they do cover the major interests, as follows, which have figured in the controversies of the Plans. (7)

PRODUCERS/OPERATORS

1. 0 City Council as Developers

1. 1 Comprehensive Redevelopment

1. 3 Roads

1. 5 Car Parks

CONSUMERS

2. 0 The Public

2. 02 New occupiers

2. 04 Motorists

2. 06 Car Park Users

2. 08 University  
Students &  
Faculty

2. 10 Shopping public

2. 12 Public at large

3. 0 Current Landowners

3. 1 Landowners displaced

3. 3 Landowners not displaced

4. 0 Current Occupiers

4. 2 Occupiers displaced

4. 4 Occupiers not displaced

Table A will now be worked through. In this it is the difference in costs and benefits of the University Plan compared with the County Plan which is consistently considered, so that the differences of adopting this rather than the County Plan can be readily appreciated.

## 1.0 CITY COUNCIL AS DEVELOPERS

### 1.1 Comprehensive Development

#### 1.3 Roads

#### 1.5 Car Parks

The projects have been described and it is now necessary to trace the financial costs and benefits which would accrue. All kinds of projects are treated together.

Each project would involve the same physical redevelopment process: land acquisition to be followed by clearance of standing property required for redevelopment and the construction of engineering and building works. Each would require public initiative in land assembly (typically by condemnation, i.e. compulsory purchase in the U.K.) and the construction of public works. But for the remunerative building development the nature of the development agencies could well differ considerably, involving permutations of the City Council, County Council and private developers. In order to foresee the financial implications it is necessary to make assumptions about the agencies. The first corresponds closely to practice in such matters. It is that the City Council would buy all the land and carry out public works and buildings including car parks, and create a ground lease for a private developer who would carry out all private works retaining leasehold ownership of the private sector. The second assumption is less real - that the City Council would receive no financial contribution from the County Council or Central Government. Any variation from these assumptions would affect not the total financial costs and returns, but their incidence. The implications could then be considered following the Analysis.

One other assumption is necessary. While some of the necessary technical, economic and financial feasibility tests have been carried out by the County or University, they have not all been, but it is assumed that the projects are satisfactory in this respect.

Following these assumptions, the financial costs and returns to the City on each project has been estimated with future costs and returns discounted back to the current date, this being the time of decision on the investment. The capital costs related to the total outlay on land and works. (8) This is then translated to annual costs, at the borrowing rate of 6% for the public sector and at the risk rate of 8½% for the private sector. (9) The returns are based on estimated net rack rents for the private sector, that is, full market rents net of all operating costs. For buildings in the public sector where there are no market values the return is taken to equal the borrowing rate on cost, for this is what the City would have had to pay for such works on other sites. (10) From the estimated annual cost and return the annual surplus or deficit is calculated for each project when completed, and discounted back.

TABLE 2

CAPITAL COST OF PROJECTS IN COUNTY AND  
UNIVERSITY PLANS

	Phase 1		Phase 2		Phase 3		Phase 4		Total	
	Land	Works	Land	Works	Land	Works	Land	Works	Land	Works
<u>County</u> <u>Redevelopment</u> <u>Areas</u>	4,415	7,245	2,345	1,330	2,245	1,975	570	420	9,575	10,970
Roads	850	1,670	-	-	1,435	1,015	-	-	2,285	2,685
Car Parks	65	1,075	200	930	-	-	-	-	265	2,005
Total	5,330	9,990	2,545	2,260	3,680	2,990	570	420	12,125	15,660
Total - Amount	15,320		4,805		6,670		990		27,785	
%	55		17		24		4		100	
Total discounted	12,900		3,000		3,150		340		19,400	
									8,400	
									11,000	
<u>University</u> <u>Redevelopment</u> <u>Areas</u>	3,060	8,900	2,665	6,260	-	-	-	-	5,725	15,160
Roads	705	1,115			1,420	1,140	-	-	2,125	2,255
Car Parks	65	1,075	150	530	-	-	-	-	215	1,605
Total	3,830	11,090	2,815	6,790	1,420	1,140	-	-	8,065	19,020
Total - Amount	14,920		9,605		2,560		-		27,085	
%	55		35		10		-		100	
Total discounted	12,500		6,100		1,200		-		19,800	
									5,900	
									13,900	

Note : Phase 1 : 0-5 years  
 2 : 5-10 "  
 3 : 10-15 "  
 4 : 15-20 "

Table 2 summarises the position on capital cost, grouping the redevelopment areas, roads and car parks for each of the four phases as shown in Table 1. From the Table the following emerges :-

- (a) The University Plans have a smaller total capital outlay than the County (£27.1m as against £27.8m) but in effect the capital cost for each Plan would be much the same.
- (b) But of the total, the transfer cost of land acquisition would be much lower in the University Plan (some £8 million against £12 million) so that the greater real resources would be needed for the University Plan (£19 million against £15.7 million).
- (c) The proportion of total investment in each phase would not be the same for the two Plans, the big difference being the University's Plan higher investment in the second and lower investment in the third phase.
- (d) To adjust for this, the cost in each phase is discounted back to 1963, which makes the University Plan somewhat more expensive at 1963 values. But the excess (£400,000) is still marginal. (11)

The position on annual cost and return with net surplus or deficit is summarised in Table 3, following the same grouping in Table 2, for each group of works in each phase.

The following conclusions emerge :-

- (a) Both schemes show a heavy total net annual loss.
- (b) The University Plan loss would be greater, at £584,000 being about  $17\frac{1}{2}\%$  more than that for the County at £498,000.
- (c) None of the University redevelopment schemes would show a surplus but certain of the County schemes would (i. e. nos. 4, 5, 7, 8 and 9).
- (d) The proportion of cost and income streams would not correspond for each of the Plans, the big difference being that the University costs would rise more rapidly and return less rapidly.
- (e) Discounting on the same basis as in Table 1, the University Plan would still involve greater total annual loss than the County at present value (i. e.

TABLE 3

ANNUAL COST AND RETURNS FOR PROGRAMME IN COUNTY AND UNIVERSITY PLANSUnderlined figures are negative

	Phase 1			Phase 2			Phase 3			Phase 4			Total		
	C	R	B	C	R	B	C	R	B	C	R	B	C	R	B
County Red Areas	857	803	<u>54</u>	251	239	<u>12</u>	299	269	<u>30</u>	70	74	4	-	-	-
Roads	172	-	<u>172</u>	-	-	-	160	-	<u>160</u>	-	-	-	-	-	-
Car Parks	70	27	<u>43</u>	63	32	<u>31</u>	-	-	-	-	-	-	-	-	-
Total	1099	830	<u>269</u>	314	271	<u>43</u>	459	269	<u>190</u>	70	74	4	1942	1444	<u>498</u>
%	56	58	-	16	19	-	24	18	-	4	5	-	100	100	-
Discounted	922	696	<u>226</u>	198	171	<u>27</u>	216	126	<u>90</u>	25	26	1	1361	1019	<u>342</u>
Discounted rate/return															5.25
University Red Areas	833	431	<u>402</u>	644	825	<u>181</u>	-	-	-	-	-	-	-	-	-
Roads	123	-	<u>123</u>	-	-	-	171	-	<u>171</u>	-	-	-	-	-	-
Car Parks	70	24	<u>46</u>	41	18	<u>23</u>	-	-	-	-	-	-	-	-	-
Total	1026	455	<u>571</u>	685	843	<u>158</u>	171	-	<u>171</u>	-	-	-	1882	1298	<u>584</u>
%	55	35	-	36	65	-	9	-	-	-	-	-	100	100	-
Discounted	861	381	<u>480</u>	432	530	98	80	-	<u>80</u>	-	-	-	1373	911	<u>462</u>
Discounted rate/return															4.6

Note: C - Cost  
 R - Return  
 B - Balance - Where underlined the figure is negative

£462,000 against £342,000) being some 35% more.

(f) Accordingly, in terms of discounted rate of return on outlay (12), the University Plan would show 4.6% as against the County's 5.25%.

#### Reduction

The discounted net annual loss for each scheme is transferred to Table A as the ultimate reduction for this item. The University scheme is the poorer, having a greater annual loss (£462,000 against £342,000) for much the same total capital outlay but greater investment in real resources. The difference is too great to be considered as negligible within the margins of error in this kind of calculation.

### 2.0 THE PUBLIC

#### 2.02 New Occupiers

Private Buildings At this stage there are no facts as to who the occupiers of the new private buildings will be, but clearly they will in part be some of those displaced on redevelopment, and in part some from elsewhere. Insofar as they are displaced, the costs and benefits which result are considered under paragraph 4.2 below. This item considers only the costs and benefits in the new accommodation, wherever the occupants come from. The costs could be measured by rental values, and therefore in money terms. The benefits would be non-measurable. But it can be assumed that benefit to each occupier would exceed cost, for otherwise he would not take up the accommodation. And since there would be more new occupiers in the University Plan, the probability is that the total net benefit in the University Plan would exceed that in the County Plan.

Public Buildings The users of the new public buildings would be residents of the City and beyond. They would have intangible benefits, which would be the same in either scheme, since the new buildings are common to both, as would be the number of users. The costs would be borne by the City as developers and are included in item 1.0 above. They are therefore shown by "E".

#### Reduction

The schemes are neutral for public buildings. For private buildings benefit exceeds cost in each scheme and, since there would be more new occupiers, total net benefits in the University Plan would exceed total net benefit in the County Plan.

## 2.04 Vehicle Users

The benefits of using vehicles are not direct but are derived from the purpose for which the vehicle is used - the visit to the cinema, the purchase of clothes, the delivery of sugar beet to the factory. Such benefits, particularly when they are consumer benefits, are difficult to measure, and are here treated as intangibles. The costs of using vehicles include the variable costs of operation, time taken, nervous strain of driving and travel, and accident hazard. These are mostly measurable, and largely in financial terms. (13)

While the County Plan is built up on detailed traffic studies, it has not been tested by specific highway cost-benefit analysis. But certain conclusions can be drawn from the available data as to the essential differences in costs and benefits between the two Plans.

### (a) Through and Local Through Traffic

Both Plans are designed to enable vehicles passing through Cambridge, or not having business in the centre itself, to do so with equal ease, in terms of speed, free flow, freedom from accident hazard, etc. Since the volume of traffic would be the same, and the users of such vehicles will have similar costs and benefits, using these terms as defined above, the Plans are neutral in this respect.

### (b) Stopping Traffic

But the Plans differ in respect of vehicle users wishing to use the centre. The numbers in the University Plan would be greater, and while both Plans would enable all who wish to do so to visit the centre by using vehicles on roads which are assumed to be designed on the same standards for free flow, etc., and so give equal benefit to each user, the University Plan would enable each to do so at lesser cost. This would arise because the redevelopment there (on a larger site and with fewer buildings to be retained) would result in a modern centre being provided more rapidly, which would result in cost savings in two ways. First, vehicles delivering goods to shops and business premises would be able to do so more efficiently, resulting in time saving. This is measurable in money terms, for the time so saved would be paid for as part of the delivery costs. (Such cost saving would probably result in higher profit to the firm carrying out the delivery, for both retail and wholesale prices would probably be unaffected). Secondly, there would be less accident hazard, for not only would segregation of vehicles and pedestrians be achieved more quickly, but it would be more effective, for a complete pedestrian precinct in the historic core would take longer to realise and the complete exclusion of service vehicles would be impossible to achieve. The saving would accrue to both the vehicle user and the pedestrian. It is capable of measurement in money terms, although very difficult.

### Reduction

The reduction clearly shows advantage to the University. A greater number of vehicle users would each have lower costs.

## 2.06 Car Park Users

The use of a car park is an incidental of the vehicle trip and the benefit, therefore, like that of the trip itself is derived from the purpose for which the vehicle is used (para. 2.04 above). This is an intangible. The cost of parking to the user is the financial charge plus the time of getting into and out of the car park plus the time spent in walking from the car park to the trip - destination(s).

There would be a greater number of car park users in the University Plan. Since each Plan provides for all car park needs they are neutral as regards the intangible benefit for each motorist; and since each is assumed to involve the same car park charge per car they are neutral also in this respect for each motorist. As to time costs, those of ingress and egress to the car parks are likely to be the same for each motorist, but the comparative time costs of walking from car parks to destination is more difficult to foresee. In the University Plan, short term car parks would be nearer the shops and long term car parks nearer workplace than in the County Plan, and thus save walking time. But the creation of twin centres would have the result that those people wishing to use both centres on a particular trip would have to spend time either walking between the centres or moving the car from one car park to another. The probabilities are difficult to foresee.

### Reduction

In the University Plan, car park users would have greater total car park benefits for greater financial costs and time costs of ingress and egress. But the outcome is uncertain as to time costs between the car parks and destinations. The net position is uncertain.

## 2.08 University Faculty and Students

The two Plans have similar proposals for new University buildings so that no differences will arise under this head. But the Plans would give rise to two other differences, both affecting the Faculty and Students, who would total the same number in each Plan. First, since the University scheme would result in fewer people using the historic centre, the Faculty and Students in term time would suffer less congestion in the area surrounded by the Colleges, in which they spend so much of their time. Such costs are difficult to measure, and are here regarded as intangible. An 'i' entry is shown. Second, since the University scheme would have many of the Central Area facilities (shopping, entertainment, feeding) in the City Road area, and thus at greater distance from the hub of University life, the Faculty and Students would have greater time costs in making use of them. These can be measured, and a 't' entry is shown.

### Reduction

Since the University has more time costs in one of the two objectives described, and less intangible costs in the other, the outcome is uncertain.

## 2.10 Shopping Public

The pattern of shopping trips under the two schemes would be different. In the County scheme a regional population of some 300,000 would use the central core, and of these the urban Cambridge population of 135,000 would have strong local centres available. By contrast, in the University scheme a regional population of some 400,000 would use the existing core and City Road Area in combination, and of these the urban Cambridge population of 150,000 would use the central shops more intensively than in the County scheme, for they would have weaker local centres.

The prime aim of the shopping public is to exchange goods and services (benefits) for money (costs). But the transaction itself is only the culmination of the shopping process. In carrying it out the public is concerned with a wider range of costs than price alone which are enumerated in the following list of instrumental objectives.

1. Wide range of goods and services. With a greater support population the University scheme would offer a wide range of goods and services, and so would have greater intangible benefits.

2. Low price of goods and services. Since in either scheme the price of goods and services should be equal, they are neutral in this respect.

3. Convenient scanning goods and services. The wider the range of goods and services which are available in one spot, the greater the convenience to the shoppers. Since the University scheme will have a modern centre more quickly, it is likely to have larger units (department stores, supermarkets, individual shops) sooner than the County scheme and be less broken up by non-shopping frontages. It will, therefore, involve less time cost in comparison shopping.

4. High amenity of premises. For the same reason as just mentioned, the University scheme would be better in having pleasanter premises to shop in. The difference in cost cannot be measured.

5. Easy pedestrian circulation between shops. For the same reason again, the University scheme should cause less time cost in circulation between individual shops; it would offer covered circulation space, precincts, etc. against the traditional circulation pavements of the old core.

6. Easy pedestrian circulation between shopping centres. Since the University scheme would have the twin centres, many people would find it necessary to travel between the two by foot, bus or car. The University scheme would thus occasion increased costs of this kind. They would be measured in terms of time and money operating costs. They are largely covered in paras. 2.04 and 2.06 above, and an 'E' is shown.

8. Easy parking. The University Plan would result in less time costs in ingress and egress to car parks. This is covered in para. 2.06 so that an 'E' is shown.

9. Rapid pedestrian circulation between car parks and shops. For the reasons given in para. 2.06 above, the University scheme should be capable of providing very convenient access between the car parks and shops themselves, a feature which the County scheme cannot so fully provide because of the difficulty of finding car parks close in to the centre core. Since this is covered in para. 2.06 an 'E' is shown.

10. Rapid pedestrian circulation between bus station and shops. Local buses should be able to serve both schemes with equal convenience, but for the same reason as in para. 2.06 a County bus station, however well located, must be more inconvenient for pedestrians in the University scheme. It cannot get near both centres at the same time. The University scheme would thus involve greater time costs.

11. Freedom from accidents. For the reasons given in para. 2.04 the University scheme should have less accident hazard in the shopping centre. This has been covered in para. 2.04 and an 'E' is shown.

12. Low cost of travel to car parks and bus station. The differences in numbers and distance of shopping trips - by bus, car, cycle and foot - are capable of estimation. But they have not been measured. However, it is apparent that 100,000 more regional population would use central Cambridge in the University scheme, including 15,000 more people from urban Cambridge. But the travel costs of the additional population should not be reckoned in Table A, for these people would, in the County scheme, live elsewhere and use other regional centres. Were a regional study available the difference in time and money costs could be measured. But in its absence, in this analysis equal costs between the schemes is assumed.

#### Reduction

Of the twelve entries, seven are ignored in the reduction: nos. 2 and 12 because the costs are equal in the two schemes, and nos. 6, 7, 8, 9 and 11 because they are reckoned elsewhere. Of the remaining five entries the University scheme would have less intangible cost in offering a wider range of goods and services (no. 1); less intangible cost in the amenity of premises (no. 4); less time costs in scanning of goods and circulation between shops (nos. 3 and 5) but greater time costs in circulation from country buses to shops (no. 10). The reduction thus cannot be completely resolved, but the University scheme would appear to have greater net benefits.

## 2. 12 Public at large

The character of Cambridge. An objective of the County Plan is that "Cambridge should remain predominantly a University Town". This the University has criticised as too diffuse, preferring as an objective "To maintain and enhance the character of Cambridge as a University Town". Despite the criticism and difference of wording, the two aims would appear to be much the same - that Cambridge, when either Plan is implemented, should recognisably be a university town.

Both County and University discuss this aspect in their written material. But neither has defined precisely just what is its image of a University Town; and while each is critical of the other in alleging that its own Plan would better conserve the image, neither is precise in bringing out the merits or demerits of the respective Plans in this regard. It is therefore necessary to suggest the instrumental objectives which should be pursued to achieve a university town and to compare the plans accordingly. This is attempted, from a perusal of the written material. (14) The conclusion is that the important instrumental objectives are four in number, as listed and analysed in Table A. The first relates to the town as a whole and the remainder to the centre. Since they are all in the nature of outputs resulting from investment or its absence they are listed as benefits.

As to incidence, the benefits from the conservation of the character of Cambridge would accrue to a wide public - the citizens of Cambridge, including University staff and students, regional population who use the city, and tourists from the country and abroad. The numbers in both plans would be much the same. Since their costs of enjoying Cambridge are much the same under either scheme it is to the difference in benefit that we must look.

1. Maintain dominance of University influence in the City as a whole. If Cambridge is "to remain predominantly a University town" it is implied, in the County's view, that "the University atmosphere should remain dominant and no large scale industrial or commercial growth should be allowed to change the emphasis, to make it (Cambridge) a town with a University". To this end, the County accepts and welcomes the continued growth of the University itself but, as mentioned, proposes to stop the growth of the City beyond a population of 100,000 and of urban Cambridge beyond 135,000. This is being done primarily by two means: firstly, allocating only sufficient residential land for this population within a tightly controlled green belt and, secondly, limiting expansion of employment opportunities in and near Cambridge. In pursuing this policy (which it has done with notable if not complete success since the similar objectives were advocated in the Holford Plan of 1950) the County accepts the diversion of regional support population to competing centres in the Cambridge Region, for this would help to syphon off growth from Cambridge itself.

The University does not completely support these deflationary objectives. Starting from the point that it is not feasible for the centre of Cambridge to contain both the University and regional functions, and wishing to

improve the City's function "as the social, cultural and commercial centre of the surrounding region", it proposes to create in City Road "a regional centre capable of meeting the need not only of the City but of the wide area surrounding the City". From this flows the acceptance of an urban Cambridge population of 150,000 and that Cambridge should serve a wider regional population, estimated at 400,000.

The implementation of the University Plan would therefore, oddly enough, work against University dominance in the town as a whole. But since the difference in the population figures are not very great in this context (and joint estimates by both sides would probably bring them nearer) the University Plan is only slightly inferior on this point.

2. Maintain intermingling of town and gown activity in the Centre. But if the University is to dominate the town it must not overshadow it and so produce a cloister, for then a vital part of the character is lost; the everyday life of central Cambridge flowing around the colleges. It is this which currently gives Cambridge its "unique blend of market town and colleges" although the blend currently contains too much vehicular traffic - a point dealt with in 4 below.

The County Plan would retain the current intermingling of town and gown, for it proposes to retain the centre in the lee of the colleges in much the same balance between the two as currently exists; the expected increasing pressure of shoppers would be syphoned off to the minor centres.

The University Plan, however, visualises a major syphoning of town activity from the centre, leaving behind an unspecified quantity of shops, service establishments, restaurants, etc., to serve the colleges and visitors. Just how much town activity would remain is difficult to forecast. But it is likely that the current relative weights will be reversed, so that in activity the present centre would perhaps be the Fitzroy/Burleigh Street of the new City Road regional centre.

A conclusion on this aspect is not easy to reach, for the appropriate levels of intermingling are difficult to specify. The current level could well be suitable if the vehicular traffic were removed, which the County Plan proposes. Given this, it would appear that the County Plan is more likely to produce a mix which is nearer the "unique blend" than would the University Plan; town activity would no doubt be relatively increased, but the degree of change would be less than in the University Plan, where a significant amount of everyday life would be syphoned away. The effect is intangible.

3. Retain architectural expression in the Centre. The two instrumental objectives just described can be achieved and yet not produce a University Town, unless they find appropriate architectural expression and achieve an appropriate physical character. These qualities have been authoritatively described by Thomas Sharp. "This special physical character of the true university-town mainly arises from the physical interpenetration of the two parts, university buildings mingling with town buildings, and town buildings with university buildings. As a result of this interpenetration and intermingling the varied, lively, intricate, complicated, dramatically diversified townscape, which is the characteristic of

the true university-town, is created. The town buildings foil each other" by way of building scale, design, materials and form. (15)

Dr. Sharp reviews central Cambridge in detail and concludes, unexpectedly, that while it still has exceptionally high physical quality, very little remains of the true university town in the physical sense, the damage having been done by both University (including college) and non-university building. Deliberate architectural policy is necessary to protect what is left and to recreate the physical university town, a policy which he goes on to describe.

Accepting as a starting point Dr. Sharp's assessment of the present physical character of central Cambridge, and his policy for the future, what will be the impact of the two Plans ?

The University scheme would preserve the present fabric of central Cambridge outside the colleges longer than the County scheme, for there would be no foreseeable large scale local authority inspired redevelopment outside Lion Yard, and lower site values would defer private redevelopment. The existing physical character of central Cambridge would thus continue longer. But it would not last for ever, and certainly not throughout the 21st century, for the buildings are generally quite old. Rebuilding would be sporadic and in comparatively small units. These conditions would make it possible to have a satisfactory architectural policy. But a satisfactory university town in the physical-architectural sense could hardly emerge if the town-activity were drastically syphoned off and all that was left for physical contrast with the college buildings were the pale relics of a town centre. Perhaps more would remain than Dr. Sharp visualises ("only a few book shops, some tobacconists and a coffee shop or two among a solid mass of university and college buildings") but, he affirms, in this direction is the end of Cambridge as a university town in the sense of the unique blend and also, therefore, in the physical sense.

The County scheme, in Dr. Sharp's view, could also be the end of Cambridge in the physical sense, for the major redevelopment that would follow could produce a "Wigan or Watford-in-Cambridge". But the reason would be different: the essential mixture of buildings would remain but with poor design in the new buildings the essential physical form of a university town would not emerge. Such poor design could come from comprehensive redevelopment with its typical contemporary architectural form of large, unsympathetic units. But while an appropriate architectural policy in these circumstances would be much more difficult to achieve than with piecemeal redevelopment, it would not be impossible, given the appropriate skill in civic design.

A conclusion on this aspect of "architectural expression" is not easy to reach, for in each of the two schemes there is uncertainty as to what the implementation would bring: as to content in the University Plan and form in the County Plan. But on the information available it is possible to assess probabilities. The University Plan, with City Road as the regional centre, would for a while maintain the present physical character of central Cambridge (which if not of a high absolute

level is nonetheless relatively very acceptable) but in the next century could well produce a university suburb and not a university town. The County Plan on the other hand would rapidly destroy the present character but could conceivably produce a genuine university town of a most exciting kind, with traditional university and college buildings contrasted with contemporary architecture. This could well be much superior to contemporary Cambridge - but it could well be an architectural tragedy.

On balance, given planners and architects of the right kind, an assumption we dare not abandon for we otherwise abandon hope, both Plans could well produce a fine university town in the physical sense: the County Plan by good civic design and the University Plan by ensuring that too much town activity is not syphoned away. But equally well, each could fail. The outcome is not certain.

4. Reduce influence of the motor vehicle on the environment in the Centre  
The first objective is common to the planning of all central areas and not unique to Cambridge, but is nonetheless vital. The objective is to prevent the motor vehicle, both in the stationary and moving state, from ruining the urban environment. The danger, as a trenchant Report has pointed out, comes from the threat to safety, including the anxiety about the possibility of accident; noise; fumes and smell; the unpleasant visual impact of both the vehicles and the street furniture necessary to deal with them; and the nuisance in the streets cluttered up by stationary vehicles which interfere with other activities. (16) All these could be considered as instrumental objectives but only some are covered in this study. (17)

As to the moving vehicle, the damage comes from its very presence so that the only way to secure protection is by the instrumental objectives of reducing traffic converging on the historic core and excluding any "non-essential" traffic from the core. On the first, the University Plan has greater benefit for considerable converging traffic would go to City Road, although the policy of concentrating shopping in central Cambridge itself would attract greater volumes to the inner zones of Cambridge than would the County's dispersal policy. On the second, the University Plan has less benefit, for unlike the County Plan it would not have an inner relief road and exclude traffic from the central core. Both items could be measured by numbers of vehicles.

Coming now to the vehicle in its stationary state, the danger to environment is from the visual impact of surface and multi-storey car parks, which can be so damaging in their scale, and also from the interference with other activities of the vehicle parked in streets. Since both the County and University Plans envisage much the same distribution of surface and multi-storey car parks near the central core, they can be taken to be neutral in this respect. But, for the reasons just mentioned, the University scheme would give rise to more vehicles parked in the streets in and near the historic core itself (which would be largely closed to vehicles in the County scheme) and so would involve less benefit in this respect. Both could be measured in physical terms, in numbers of vehicles.

### Reduction

Of the four instrumental objectives discussed, the third is uncertain, and in the first and second intangible benefits are against the University Plan. In the fourth objective, in one sub-objective the Plans are neutral, two are against the University Plan and one in favour; while the entries are not of even weight, so that a complete reduction is not possible, the University Plan would appear to be inferior. A scrutiny of the entries enables the probabilities to be gauged. The University Plan is inferior on three counts: dominance of the University influence, intermingling of town and gown activity, and moving and standing vehicles in the historic core. On balance, therefore, the unexpected conclusion emerges that the University Plan is less likely than the County's to maintain the character of Cambridge as a University town.

## 3.0 CURRENT LANDOWNERS AND OCCUPIERS

As already indicated, all land required for the comprehensive redevelopment and the road and car parks would be bought from the current landowners so that they and the current occupiers would incur costs and benefits. In addition, certain landowners and occupiers who would not be displaced would be affected. Each category is considered in turn.

### 3.1 Landowners displaced by redevelopment, roads and car parks.

The displaced owners will receive a capital benefit amounting to the compensation for their property at market value, but suffer an annual cost equal to the net revenues foregone. The compensation excludes that for disturbance, since this is paid for the occupation and not ownership interests, and is therefore included in item 4.2. Since the compensation is at market value, the owners' asset position will be the same before and after displacement. (18) The discounted capital cost and value is £8.72m. in the County Plan and £5.65m. in the University Plan. The relevant entry is shown in Table A.

### Reduction

Since the owners' costs in each scheme equal their benefits, they are neutral as between the Plans.

## 4.0 CURRENT OCCUPIERS

### 4.2 Occupiers displaced by redevelopment, roads and car parks.

The impact on the displaced occupiers is more complex. Table 3 summarises the information in Appendix A on the displacement in terms of numbers of properties in three classes (residential, business and institutions) and grouped by time phase of disturbance. Since there are certain omissions in Appendix A, certain information not being available, only broad conclusions can be drawn from

the Table. It shows that the University Plan displaces more properties of each class, and that it has a greater impact in the first two phases.

TABLE 4

Numbers and use of properties displaced by the two Plans

Phase	Residential					Business					Public					Total
	1	2	3	4	Tot.	1	2	3	4	Tot.	1	2	3	4	Tot.	
County Plan	269	156	379	18	892	203	51	132	28	414	13	9	11	-	33	1339
University Plan	558	389	373	-	1310	183	127	111	-	421	11	-	9	-	20	1750

Both prior to and after displacement all occupiers would have the intangible benefits of occupation (location, associations, shelter) for money payment. But the benefits and costs for each would each differ in amount, as would the relocation compensation obtainable for each class. The problem is to forecast the difference, with little knowledge of what would in fact happen to the occupants.

#### 4.21 Residential

The occupants would fall into two classes: tenants and owner-occupiers. The split is not known.

Tenants In a free market, rents would be a measure of the benefits of tenants' occupation both before and after, so that the benefits and costs would match in each case, and so therefore would the difference. In practice the tenants' difference in costs would be greater than that in benefits. The reasons are firstly that tenants tend to be sitting at contract or statutory rents which are lower than the value of the benefits and would lose the differential on displacement; and, secondly, the disturbance compensation is generally insufficient to cover costs. Offsetting this is the possibility of obtaining a subsidised local authority dwelling - but the opportunity is not always taken, and the location is often not one of free choice. Tenants on the whole therefore would suffer costs greater than benefits. The comparative number of dwellings displaced is thus a rough measure in physical terms of the comparative net costs.

Owner-occupiers In this instance, the occupiers obtain market value for their real estate interests and can invest elsewhere, where cost measures benefit. But market value does not fully compensate for replacement value and disturbance, and in general owner-occupiers would also lose. Again, the numbers of dwellings affected is a rough measure of costs.

To summarise, the University Plan would affect a greater number of dwellings on the first two phases, the disturbance being the same in the later phases. Whether the dwellings be tenanted or owner-occupied, the University Plan would thus bring greater loss on this score. (19)

#### 4.22 Business

For the purpose of this item all business undertakings (shops, offices, industry) can be considered together. But the proprietors and employers need to be discussed separately.

Proprietors Prior to redevelopment the proprietors have costs of time and operation and the benefit of net profit. On displacement they will lose both costs and benefits, but obtain compensation for the trade disturbance, estimated at a discounted value of £2.6m. in the County Plan and £0.7m. in the University Plan (i.e. £175,000 and £45,000 per annum respectively). While this is reasonably generous, it can be assumed that the difference in cost will exceed difference in benefits. Since the amount of compensation, and therefore statutory value for disturbance, is less in the University scheme, this is assumed to have smaller net costs of this kind.

Employees Prior to redevelopment the employees have costs of travel and time and benefit of wages and salaries. On displacement they will lose such costs and benefits. Since new employment opportunities will exist of the same kind and in roughly the same locality, the employees are likely to be as well off after as before, except for those who have strong personal attachments to existing posts (e.g. long service) or personal difficulties in securing new posts (e.g. through age). In total, therefore, employees will suffer net costs. The University scheme would disturb about the same number of undertakings as the County Plan, so that the schemes are neutral in this respect.

#### 4.23 Institutions

These are assumed to be owner-occupiers. Prior to redevelopment, the institutions will have the intangible benefits of occupation for the financial costs of operation. Since on redevelopment they will receive full reinstatement cost for their property, written down for depreciation, they are assumed to be in a neutral position.

#### Reduction

On the rough measures used, the University Plan would cause greater net costs in displacing residential occupiers, smaller net costs for business proprietors and the plans are neutral in respect of business employees and institutions. The outcome is therefore uncertain.

#### 3.3 and 4.4 Landowners and occupiers not displaced.

Where redevelopment takes place, the owners and occupiers of property

which is not demolished (whom it is simplest to consider together) may incur indirect costs and benefits. The repercussions are of three main kinds, as follows. (20)

#### 3. 31/4. 41 Real (technological) changes

Occupiers of standing buildings might experience real (technological) changes in the quality of the services they enjoy, simply due to the impact of the redevelopment projects. Such changes are independent of any change in the desirability or availability of alternative accommodation. An example arises where houses remain to front onto a new traffic road, and thus suffer noise. Such changes in real value lead immediately to changes in rental value, since differentials in relation to other stock are altered. This can be used as a measure of the quality change. The changes in rental value accrue to the occupiers until contract rents are adjusted, as positive or negative "profit rents". When the contract rent is adjusted, the occupier will find that change in benefits matches change in cost, as then valued by the market. The owner has a corresponding change in asset value without incurring or being relieved of any real cost. It follows from what has just been said that the change may not occur immediately, but will be discounted for the period before the change in contract rent is expected to occur.

Under this head, properties of different use classes would be affected by the two Plans, by comprehensive redevelopment, roads and car parks. Although very difficult to do, the likely increases and decreases in value to both owners and occupiers, if the schemes were implemented in 1963, could be estimated by valuers and discounted for the time which must elapse. An 'm' entry is therefore shown. The difference in this respect between the schemes is uncertain.

#### 3. 32/4. 42 Pecuniary change

Whereas it is occupiers and owners directly affected by the redevelopment project who suffer real (technological) change, all occupiers and owners might experience pecuniary external effects simply because of a change in the supply of the existing stock, relative to changes in demand. If the relative change is on a sufficient scale the result will be a change in price levels as demand adjusts itself to changed supply. Occupiers may thus experience changes in rental value without change in the quality of their occupation amenities. Their ensuing position and that of the owners will be as described in 3. 31/4. 41 above.

Because of the difficulty in forecasting, the repercussions cannot be introduced into the analysis unless the supply changes are large in scale. This applies to shopping in the University Plan, and this aspect must therefore be considered. It will be noted that repercussions of this kind are distributive in character, and are thus of significance in comparing not the efficiency of the two Plans, but their incidence.

A measure of the repercussions can be traced from Table 5 which is derived from a study which visualises the whole retail shopping provision of the

TABLE 5

DISTRIBUTION OF RETAIL SHOPPING FLOOR SPACE AND TURNOVER  
IN CENTRAL CAMBRIDGE, 1961 & 1981

	Sector of City for Shopping						
	Central Area Core	Central Area Fringe	Fitzroy/Burleigh	City Road	Sub-urban Centres	Isolated	Total
<u>Shopping Floor Space 000ft.</u>							
1961 - Existing	824	97	306	-	519	64	1,810
1981 - County Plan	1,280	170	430	-	1,230	170	3,280
University Plan	1,090	170	1,000		860	170	3,290
<u>Turnover £000</u>							
1961 - Existing	13,000		12,530				25,530
1981 - County Plan	22,000		23,000				45,000
University Plan	10,000		40,000				50,000

Source : Derived from references in footnote 4(6)  
and Census of Distribution, 1961

City as one system, and compares the distribution of retail shopping floor space and turnover in 1961 and 1981. (21)

The Table shows that all sectors under each Plan would have an increase in turnover beyond 1961, except for the central core under the University Plan. All the increases would be felt on sites to be developed or redeveloped by the City, so that the consequential rise in land value has already been reckoned in item 1.0. But the fall in the central core in the University Plan has not been so reckoned, and it is this which is considered here as a pecuniary external effect.

This substantial fall in turnover would result in a loss of trading profit to traders, spread over the 10 years during which the City Road project is built. Part of the loss would be passed on to the landowners as contract rents are revised. The result is that ultimately landowners would lose capital value, and current traders would lose an income from trading profit in perpetuity. The measure of this loss is seen from the Table. Whereas under the County Plan the turnover in the central core shops could rise from £13m. to £22m. (at constant prices) by 1981, under the University Plan it could fall to £10m. The appropriate measure of loss for this analysis would thus be £12m. (22) This would result in a loss of net trading profit which would, for some part, be passed on to the landlords in rent reduction as leases came up for renewal. Just what loss in net trading profit would fall on traders is measurable but difficult to forecast without close study of the actual retailing economics. An "m" is therefore shown in Table A. But from evidence available the ultimate net rental loss could be about 5% of the turnover loss, or £600,000 per annum. This loss would not accrue immediately but gradually over a period of years as City Road is built and leases in the central core come up for renewal. Allowing for this over a 15 year period the annual loss in perpetuity discounted to 1963 would be about £375,000 per annum. This is shown in Table A.

### 3.33 Shifted potential development value

Possible effects under this head are associated with the concepts of "shifting" and "floating" value brought into prominence in debates on the compensation-betterment problem. (23) Some general account will be given first.

Before discussing these concepts we must distinguish between two kinds of property value: current use value, related to the use of the property as it stands; and potential use value, related to the potential use of the property in response to demand whether the property remains standing or is redeveloped. Except for sub-marginal land all property has current use value, but not all has potential use value. Where this exists, any excess over current value is development value.

Given a certain demand for new construction, and a supply of sites available and suitable for development or redevelopment, potential use value can be regarded as "floating" over the sites, awaiting its time to settle. Because of differential location, etc., on some land the possibility of attracting value is greater than on others. Each site thus had a speculative potential use value (and

therefore negative or positive development value). This is based upon forecasts of a particular site's potentiality in attracting the floating value, after discounting for time, and the possibility that competing land will obtain the prior claim.

Once the floating value has settled on a particular site, space is made available through new construction, the expectation at other sites must correspondingly diminish. Conversely, once a site potentially capable of satisfying a demand is removed from competition (made into a park, for example) potential use value will be "shifted" from that site. The expectation on other sites must correspondingly rise.

Value can "shift" in another way. When occupiers displaced by clearance demand alternate accommodation they generate "floating" potential use value. If their demand is satisfied by redevelopment on the same site, the value resettles on that site. But if satisfied on another site, value "shifts" to that site at no real cost to its owner. If the demand is satisfied instead in existing accommodation, its value is enhanced without real cost to the owner, just as new development might attract value from existing property without saving in real cost to the owner.

Incidentally, "floating" or "shifting" value will not necessarily be the same wherever it settles. For any given demand, values and costs of different accommodation will vary, as will the value of the identical accommodation in different locations. So therefore will economic rent.

So far we have over-simplified the demand situation. In reality, when floating value settles onto a particular site, it sets up a kind of chain reaction: fluctuation in demand arises for other locations. Moreover, total demand continually grows and diminishes, altering expectations on particular sites in an uneven manner. This makes it difficult to forecast where potential use values will settle.

Turning now to the alternative Plans under this head of shifted potential development value, there will again be one major difference between the two schemes, which is the only one considered here, in the potential development values which would accrue to landowners as a whole. The difference would arise from two variables. First, displaced occupiers would generate a demand for relocation and site values would rise where they settle. From Table 3 is seen the magnitude of displacement in different uses. If it is assumed that the bulk of the business use which is displaced would be reaccommodated in the comprehensive redevelopment areas (and therefore already reckoned in 1.0) the only major use which could settle on other land would be residential. While it cannot be assumed that all displaced people would relocate themselves, and of those that do that they would settle in Cambridge, a first approximation is to assume that they would do so. The University Plan would clearly generate a greater amount. Since the City Road area is extensive enough to absorb both its own displaced dwellings and those not accommodated in other redevelopment areas, it is assumed that the site values generated are included in the new values for that area. An "E" is therefore shown. Secondly, the difference in expected resident and shopping

population in the two Plans would generate different site values. On this score, the University scheme would also clearly produce the greater amount. Most of this has already been reflected in item 1.0 but, by definition, the extra people could not live or shop elsewhere outside the City. While the rise in value in the City would not necessarily equal the drop which is foregone outside, a first approximation assumes that it would. The University scheme would therefore show a great net loss in site value outside the City. An 'm' is shown in Table A.

#### Reduction 3.3 Landowners

There is uncertainty about item 3.31, difference in loss or gain owing to (technological) change. On item 3.32, the University Plan would cause substantial loss of rent income to landowners in the central core, stemming from a loss in trading profit in perpetuity to traders, arising from a loss in turnover by 1981 of some £12,000,000 per annum; the estimated discounted annual value is some £375,000. On item 3.33, shifted potential development value, the University Plan would cause a greater net loss in site value outside the City owing to its attraction of greater shopping trade to the City Road area. While there is some uncertainty, the University Plan would probably cause greater transfer losses to landowners who are not displaced.

#### Reduction 4.4 Occupiers

As with item 3.41, there is uncertainty about the real loss or gain in occupation value of non-displaced occupiers. But in item 3.42, in the University scheme the loss in 1.0 to central core traders would result in a loss of net trading profits. Since the latter is great the probability is that the University scheme is inferior in this respect.

## Chapter 5

# THE SUMMATION

In order to enable the implications of Table A to be grasped more readily, Table B provides a summary. It lists each of the producers, operators and consumers as in Table A, but with a certain regrouping to facilitate analysis. Against each is put the reduction of the particular item or groups of items from Table A. But the reduced items are not in the same form. So that the University Plan may be compared with the County Plan, the net annual benefits and the net annual costs of the University Plan are deducted algebraically from the corresponding entries of net annual costs and benefits in the County Plan. The net difference (costs or benefits) is then noted in the third column. In doing this, negative costs and positive benefits are shown as positive, and positive costs and negative benefits as negative. Thus, a positive outcome (i.e. positive benefit or negative cost) shows in favour of the University Plan, and a negative outcome (i.e. negative benefit or positive cost) shows in favour of the County Plan.

The summation for each party or group will now be discussed in turn.

### PRODUCERS/OPERATORS (All figures discounted to 1963 value)

#### 1.0 City Council as Developers

Each Plan would involve much the same capital outlay (about £19.5m.) but of this the University Plan would involve greater investment in real resources (£13.9m. against £11.0m.) and less in land transfer (£5.9m. against £8.4m.). Neither plan would generate enough net revenue to finance the capital at the rates quoted (6% for public and 8½% for private); and the University Plan would generate £120,000 less per annum, showing only 4.6% discounted rate of return against the County's 5.25%.

#### 3.0 Current Landowners

The owners displaced would be in the same position under either scheme. As to those not displaced, there is uncertainty about the impact on established property values but in the University scheme the owners of central core shops would lose around £375,000 per annum, and landowners outside the City would also lose compared with the County scheme. The probabilities are against the University Plan.

#### Summary 1.0 and 3.0

The University Plan would produce significantly less income for the

same outlay and thus show a lower rate of return on investment, either of total financial outlay or real resources. Considering the margins of error in the valuation and costing, this alone might not be critical. But what is critical is that the University scheme could certainly not generate sufficient extra income over the County Plan to compensate the current non-displaced landowners who would be adversely affected, in particular those in the central core.

## CONSUMERS

Compared with the County Plan, the merits of the University Plan are :

### 2.0 Consumers directly concerned with new development (2.02 - 2.12)

#### (a) Uncertain for the following parties :

2.06 Car Park Users Whereas the University Plan car parks would be generally more convenient for City Road than the County Plan car parks for the central core, the University Plan car park users would have the counteracting difficulty of parking conveniently for using both centres.

2.08 University Faculty and Students Whereas the University Plan would result in less congestion for faculty and students in their use of the central core, they would have the counter-vailing extra time costs of using two centres rather than one.

#### (b) Worse for the following parties :

2.12 Public at large in character of Cambridge being rendered inferior Four instrumental objectives were noted for this complicated aspect. In one, retention of architectural expression, the Plans are neutral; each could succeed or fail. In two objectives, dominance of University influence, and intermingling of town and gown activity in the centre, the University Plan is inferior. In the fourth objective, influence of motor vehicle on the environment, the Plans are neutral in one respect, the University Plan is superior in one respect and inferior in two. While the weights vary, the balance would appear to be against the University Plan.

#### (c) Better for the following parties :

2.02 Occupiers of new private buildings Since there would be more occupiers of new buildings, for whom benefit would exceed cost.

2.04 Vehicle users Since a greater number of vehicle users would each have lower user costs.

2.10 Shopping public Twelve instrumental objectives were noted but

only five need be considered. In these, while a complete reduction could not be made, the University Plan would appear to be superior. As against the time loss in circulation between the centres, the University scheme would appear to have greater net benefits in offering a greater range of goods and services for choice, pleasanter shopping premises, less time cost in scanning and circulation between shops.

4.0 Current occupiers not directly concerned with new development (4.2 and 4.4)

(a) Uncertain for :

4.41 Occupation amenities of those who are not displaced, owing to difficulties of forecasting.

(b) Worse for :

4.21 Residential occupiers who are displaced, since cost exceeds benefit and there would be more in number.

(c) Better for :

4.22 Business occupiers who are displaced, since the total amount of net disturbance would be less.

4.42 Traders in central core who are not displaced would lose heavily in net trading profits.

Summary 2.0 and 4.0

It is difficult to reduce these sections further, since so many different parties are involved. But some simplification is possible.

Ignoring the uncertain items (2.06, 2.08, 4.41), but only for the moment since they might influence the decision, we can first consider together items relating to occupiers, both new, displaced and not displaced, (i. e. 2.01, 4.42, 2.02 and 4.21). In the latter two, the University Plan is inferior because of the greater residential displacement and loss of profits to central core traders. But in items 2.02 and 4.42 it would be superior for more new accommodation is offered, and more job opportunities, and less disturbance to traders who are displaced. Clearly, costs under items 4.21 and 4.42 could be minimized, for some residents and central core traders would be relocated. But the costs would not be neutralised altogether, for there would not be complete relocation and even temporary disturbance and relocation involves serious costs. We are then clearly left with items 2.12, 2.04, 2.10. In these, the University Plan would involve less benefit for the public at large in rendering Cambridge less of a University town but involve greater benefits for vehicle users and the shopping public.

## Chapter 6

# CONCLUSION

The issues have narrowed to this. Leaving aside for the moment the neutralised and uncertain items, the University Plan is inferior in involving greater disturbance costs to residential and business occupiers who are displaced (4. 21) and who are not (4. 42), and greater damage to the character of Cambridge, which is of concern to the public at large, including the world over. As against this, the University Plan would bring less costs to all vehicle users in central Cambridge (2. 04) to the shopping public (2. 10), and to business occupiers who are displaced (4. 22).

But to achieve its position the University Plan would mean greater investment in both financial and real resources, and a lower discounted financial return on total outlay, which would thus leave no margin above the County Plan to compensate the significant depreciation in property values to central core land-owners.

On this balance sheet, while it would be for elected representatives of central and local government to make the final value judgement on interpersonal comparisons between the parties affected, it is difficult to see how judgement could be in favour of the University Plan.

But before reaching a final conclusion sight must not be lost of the items in which there is uncertainty between the Plans (i. e. 2. 06, 2. 08 and 4. 41), and which so far have not been weighed into balance. The question arises, if they did in fact favour the University Plan, could this affect the conclusion.

Dealing with them in turn:

### 2. 06 Car Park Users

If, in fact, the establishment of City Road did not lead to widespread habits of using both the City Road and core on the same trip, the advantage would be with the University Plan, for car park users would then clearly be more conveniently placed for their destinations.

### 2. 08 University Faculty and Students

If faculty and students had comparatively little reason to use the City Road centre, then the net advantage would lie with the University Plan in enabling faculty and the students to have more peace and comfort when using the historic core.

#### 4.41 Occupation amenities for property not displaced

The uncertainty here is of a different character, for it is based on the great difficulty of forecasting real (as opposed to pecuniary) changes in rental value of established property consequential upon the new works. Further study could elucidate the position, if the issue were thought sufficiently important.

In short, on two of these three items, the probabilities are that the advantage lies with the University Plan: less costs to car park users and to faculty and students. On this basis, the difference in benefits of the two Plans to consumers is narrowed, thus making the value judgement on them all the more difficult. And since the big item against the University Plan in this Analysis is that relating to the complex issue of the character of Cambridge as a University town, clearly more study would be warranted on this aspect before the final judgement is made.

However, even if the final judgement on consumer benefits be neutral as between the plans, there still remains the fact that the University Plan would produce significantly less financial income for the same financial outlay and greater investment in real resources, and would cause considerable uncompensated loss to non-displaced owners in the Central core. With the benefit of the doubt on consumer benefits, it still looks doubtful, therefore whether the University Plan would show a greater margin of benefit over cost compared with the County Plan.

## Chapter 7

### THE MINISTER'S DECISION

The Minister issued his draft decision on the 1962 Inquiry in August 1964. The decision took the form of a letter outlining the main modifications to the Plan, with reasons, supported by Appendices listing detailed modifications and the Inspector's voluminous report of the Inquiry proceedings and consequential recommendations. In accordance with the statutory procedures the Minister then considered representations on his draft decision, and in March 1965 issued his final decision which, except for certain detail, did not depart from his earlier one. (24)

With the one important exception of shopping provision, to which we return below, the Minister supported the County's Plan in its essentials. He did so by not querying the basic objectives of the Plan in relation to the limit of population of the City, green belt, road proposals, car parks and principle of redevelopment of the Lion Yard, but indeed by strengthening these objectives in three respects: restraint on new employment in the City, particularly in the Central Area; the adoption of additional measures to reduce traffic in the Central Area and the strengthening of architectural control on redevelopment in the Central Area including the Lion Yard.

With regard to shopping provision, the Minister's letter points out three factors with which the County would agree: that the existing arrangements have produced congestion of people and vehicles within the ring of colleges, that unless measures are taken the congestion will grow, and that traffic measures proposed by the County will not be adequate if the whole of the City's shopping facilities (presumably current and proposed) are kept within the existing ring. His solution is to follow neither the County nor the University proposal, but to compromise between them. The compromise is to :-

- (a) allow some shopping expansion in the centre, i.e. the 10% on existing cubic capacity which is permitted under the law, the denial of which invokes compensation, together with 30,000 feet over the existing in Lion Yard, instead of the 90,000 feet extra proposed by the County;
- (b) allow no new shops in the whole of the existing central area and land adjacent, as defined;
- (c) provide for an extension of central shopping and car parking within the City Road area, by way of comprehensive redevelopment, to provide for new high intensity shopping uses, such as supermarkets;

(d) suggest that the proposed outer shopping centres would not be "major" in extent.

In a nutshell, whereas the County proposed to allow some expansion of shopping in the centre and syphon off growth of convenience shopping to major outer centres, and whereas the University proposed to have no growth in the centre and indeed to transfer the main weight to City Road where major growth would occur, the Minister proposed to settle for a middle course in the centre and have growth in City Road and not in the proposed outer centres.

Comment

In effect there is therefore a third Plan, the Minister's, which mainly follows the County Plan but offers a compromise between the two alternatives in the important matters of shopping and traffic. This compromise appears to be based on two doubts about the County's forecasts supporting its Plan, rather than the Plan itself. The first is that the central core of Cambridge is physically big enough to accommodate the future shopping needs even after allowance is made for dispersal to major outer centres. The second doubt follows - that the resultant traffic attraction to the core will be higher than the County estimate, so that its traffic proposals are inadequate.

These doubts, it should be noted, were not based on any criticism of cogent studies. The County had not in fact adequately demonstrated its view that the central core could contain the necessary shopping space, the University had no compelling argument against, and the Minister had no adequate alternative data of his own. The doubts were apparently based on the Inspector's third opinion, based on his assessment of the Inquiry submissions and the problem.

The third opinion could be dismissed as a "mere compromise". But another possibility is this. In the absence of adequate forecasts in support of either view, and because the future is uncertain, the Minister might consider that there is a risk that the County's estimates on central area shopping and floor space could be wrong, with consequential unfortunate repercussions for Cambridge. This being so, a reasonably modest adjustment of the County proposals would insure against that risk.

But whether the Minister's decision is a mere compromise or insurance against risk, there can be no certainty that his Plan is based on sounder forecasts than the other two, for it is no more than a third view, or, to be more accurate, it appears to be a confirmation of a third view, that of the Holford Plan of 1950.  
(25) Long before the growth of traffic and shopping expenditures of the 1950's were foreseen, the authors recognised that the central core might not be big enough to cater for central area shopping (after allowing for the redevelopment of Lion Yard and expansion of Fitzroy/Burleigh Street) and suggested a site for central core overflow, just in the vicinity now suggested by the Minister. This suggestion was not followed in the official County Plan.

It would be interesting to speculate as to what the ensuing history of planning in Cambridge would have been, had the proposal been followed officially. But the more relevant question from the viewpoint of this paper is how the Minister's Plan compares with the other two in terms of total cost and benefits. It is most tempting to essay an answer. But there is hardly the space here and, in any case, while a broad indication could be attempted on what is known of the Minister's Plan, there is insufficient detail at the time of writing on which to base a reasonable conclusion. All that will be mentioned in conclusion, therefore, is the approach within the methodology which has been outlined.

First, any doubts about feasibility would need to be cleared up - for example, as to whether the shopping floor space proposals of all three schemes are sound, the County car parks would be adequate, the University road proposals would be sufficient for an enlarged regional centre. From this the new programme of projects would be defined.

The analysis would then trace through under Table A, all the while comparing the Minister's Plan with the County Plan and not the University Plan. The County Plan would thus provide the datum, and it is in the variations from this datum of the other two that the three can be compared. In this way any number of variations can be handled. (26)

The result would at least give greater confidence than there can be now on which of the three Plans would be best in the public interest.

Table A

Figures in £0000

## Comparisons of Costs &amp; Benefits in University &amp; County Plans

Item No	Sector	Producers / Operators		County				University				Remarks	Net Advantage To		
		No		Instrumental Objectives		Benefit		Cost		Benefit					
		Cty	Univ	C	A	C	A	C	A	C	A				
1·0	City Council or Developers					34.2				46.2		12·0	C		
1·0	Reduction see table 2					34.2				46.2		12·0	C		
3·0	Current Landowners														
3·1	Displaced Reduction			872		872		565		565		≡	N N		
3·3	Not displaced														
3·31	[a] Real Changes all property			M <sub>1</sub>		M <sub>2</sub>		M <sub>3</sub>		M <sub>4</sub>		?	N/C		
3·32	[b] Pecuniary Changes - core Shopping									375		375	C		
3·33	[c] Shifted potential development values - Displacement Population			M <sub>5+</sub>		ε		M <sub>5</sub>		ε		M <sub>5</sub> < M <sub>5+</sub>	1·0 C		
3·3	Reduction				m <sub>1</sub> m <sub>5+</sub>		m <sub>2</sub>		m <sub>3</sub> m <sub>5</sub>		m <sub>4</sub>		Prob		
										375					

Table A

Figures in £0000

## Comparisons of Costs &amp; Benefits in University &amp; County Plans

Item No	Sector	Consumers		County				University				Remarks	Net Advantage To		
		No		Instrumental Objectives		Benefit		Cost		Benefit					
		Cty	Univ			C	A	C	A	C	A				
2.02	New Occupiers [a] Private Building – Occupiers					i <sub>1</sub>		m <sub>6</sub>		i <sub>2</sub>		m <sub>7</sub>	i <sub>2</sub> > i <sub>1</sub> m <sub>7</sub> > m <sub>6</sub> [i <sub>2</sub> – m <sub>7</sub> ] > [i <sub>1</sub> – m <sub>6</sub> ]	U	
	[b] Public Building – Residents					i <sub>3</sub>	e		i <sub>3</sub>	e		= / I.O	N		
2.02	Reduction					i <sub>1</sub>		m <sub>6</sub>	i <sub>2</sub>		m <sub>7</sub>		U		
2.04	Vehicle users [a] Through & local through	n	n	Free flow & freedom from accidents	i <sub>4</sub>			m <sub>8</sub>	i <sub>4</sub>		m <sub>8</sub>	=	N		
	[b] Stopping traffic – delivery of goods	n	n+	Rapid delivery				m <sub>9+</sub>			m <sub>9</sub>	m <sub>9</sub> < m <sub>9+</sub>	U		
	vehicle users & pedestrians			Freedom from accidents				m <sub>10+</sub>			m <sub>10</sub>	m <sub>10</sub> < m <sub>10+</sub>	U		
2.04	Reduction							m <sub>9+</sub> m <sub>10+</sub>			m <sub>9</sub> m <sub>10</sub>		U		
2.06	Car Park Users	n	n+	1. Provision of car park space 2.Low financial charges 3Rapid ingress & egress 4Proximity to destination	i <sub>5</sub>				i <sub>5+</sub>			i <sub>5+</sub> > i <sub>5</sub>	U		
								m <sub>11</sub>			m <sub>11+</sub>	m <sub>11+</sub> > m <sub>11</sub>	C		
						t <sub>1</sub>			t <sub>1+</sub>	t <sub>1+</sub> > t <sub>1</sub>		C			
						t <sub>2</sub>			t <sub>3</sub>			?	N/C		
2.06	Reduction				i <sub>5</sub>			m <sub>11</sub> t <sub>1</sub> t <sub>2</sub>	i <sub>5+</sub>		m <sub>11+</sub> t <sub>1+</sub> t <sub>3</sub>	?	N/C		
2.08	University Faculty & Students	n	n	1Congestion in centre 2Convenience of centre				i <sub>6+</sub>			i <sub>6</sub>	i <sub>6</sub> < i <sub>6+</sub>	U		
								t <sub>3</sub>			t <sub>3+</sub>	t <sub>3+</sub> > t <sub>3</sub>	C		
2.08	Reduction							i <sub>6+</sub> t <sub>3</sub>			i <sub>6</sub> t <sub>3+</sub>	?	N/C		

Table A

Figures in £0000

## Comparisons of Costs &amp; Benefits in University &amp; County Plans

Item No	Sector	Consumers		County		University		Remarks	Net Advantage To		
		No		Instrumental Objectives		Benefit					
		Cty	Univ	C	A	C	A				
2.10	Shopping Public	300,000 400,000	1. Wide range of goods & services 2 Low prices of goods & services 3 Convenience of scanning 4 High amenity of premises 5 Easy pedestrian circulation between shops 6 Easy pedestrian circulation between shopping centres 7 Low price of parking 8 Easy parking 9 Rapid circulation, car parks to shops 10 Rapid circulation bus station & shops 11 Freedom from accidents 12 Low cost of travel to car parks & bus station	i <sub>7</sub>		i <sub>7</sub> +		i <sub>7</sub> > i <sub>7</sub>	U		
					m <sub>12</sub>			m <sub>12</sub>	N		
					t <sub>4</sub> +			t <sub>4</sub> t <sub>4</sub> < t <sub>4</sub> +	U		
				i <sub>7</sub> +			i <sub>7</sub>	i <sub>7</sub> < i <sub>7</sub> +	U		
					t <sub>6</sub> +			t <sub>6</sub> t <sub>6</sub> < t <sub>6</sub> +	U		
					e			2.04/2.06	e		
					e			2.06	e		
					e			2.06	e		
					e			2.06	e		
					t <sub>7</sub>			t <sub>7</sub> + t <sub>7</sub> > t <sub>7</sub>	C		
					e			2.04	e		
					m <sub>13</sub>			m <sub>13</sub>	N		
2.10	Reduction		i <sub>7</sub>	t <sub>4</sub> +	i <sub>7</sub> +	t <sub>4</sub>		Prob	U		
				i <sub>7</sub> +		i <sub>7</sub>					
				t <sub>6</sub> +		t <sub>6</sub>					
				t <sub>7</sub>		t <sub>7</sub> +					
2.12	Public at large	n n	1 Maintain dominance of University in City 2 Maintain intermingling of town & gown in core. 3 Maintain architectural expression 4 Reduce influence of motor vehicle on environment moving vehicles — Converging on core Passing through core stationary vehicles — Car parks Streets	i <sub>8</sub> +		i <sub>8</sub>		i <sub>8</sub> < i <sub>8</sub> +	C		
				i <sub>9</sub> +		i <sub>9</sub>		i <sub>9</sub> < i <sub>9</sub> +	C		
				i <sub>10</sub>		i <sub>11</sub>		?	N/C		
				P <sub>1</sub>		P <sub>1</sub> +		P <sub>1</sub> > P <sub>1</sub>	U		
				P <sub>2</sub> +		P <sub>2</sub>		P <sub>2</sub> < P <sub>2</sub> +	C		
				P <sub>3</sub>		P <sub>3</sub>		≡	N		
				P <sub>4</sub> +		P <sub>4</sub>		P <sub>4</sub> < P <sub>4</sub> +	C		
				i <sub>8</sub> +		i <sub>8</sub>					
				i <sub>9</sub> +		i <sub>9</sub>					
2.12	Reduction		i <sub>10</sub> P <sub>1</sub> P <sub>2</sub> + P <sub>4</sub> +	i <sub>10</sub>		i <sub>11</sub>					
				P <sub>1</sub> +		P <sub>2</sub>					
				P <sub>2</sub> +		P <sub>4</sub>					

Table A

Figures in £0000

## Comparisons of Costs &amp; Benefits in University &amp; County Plans

Item No	Sector	Consumers			County			University			Remarks	Net Advantage To
		No		Instrumental Objectives	Benefit		Cost		Benefit		Remarks	Net Advantage To
		Cty	Univ		C	A	C	A	C	A		
4.2	Occupiers displaced											
4.21	[a] Residential Tenants Own/Occup	n	n +				p <sub>5</sub>		p <sub>5</sub> +	p <sub>5</sub> + > p <sub>5</sub>		C
4.22	[b] Business Proprietors Employees	n	n		260		p <sub>7</sub> +	70	p <sub>7</sub>	[p <sub>7</sub> + - 260] [p <sub>7</sub> - 70]		U
4.23	[c] Institutions	n	n			i <sub>12</sub>	m <sub>15</sub>	i <sub>12</sub>	m <sub>15</sub>	≡		N
4.2	Reduction				17		p <sub>5</sub> p <sub>6</sub> p <sub>7</sub> +	4	p <sub>5</sub> + p <sub>6</sub> + p <sub>7</sub>	?		N/C
4.4	Occupiers not displaced											
4.41	[a] Real changes in occupation value											N/C
4.42	[b] Pecuniary changes in traders profit in central core				m <sub>16</sub>	m <sub>17</sub>	m <sub>18</sub>	m <sub>19</sub>	m <sub>20</sub>	?		C
4.4	Reduction				m <sub>16</sub>	m <sub>17</sub>	m <sub>18</sub>	m <sub>19</sub> m <sub>20</sub>	m <sub>19</sub> m <sub>20</sub>	Prob C		C

Table B

Figures in £0000

## Net Difference in Annual Costs &amp; Benefits Between University &amp; County Plan

Producers/Operators				University Plan Minus County Plan			Net Advantage To	
Item No	Sector Reduction	Number		Benefit	Cost	Net		
		Cty	Univ					
1.0	City Council as Developers				120	120	C	
3.0	Current Landowners			..	..	..	N	
3.1	Displaced			m <sub>3</sub> m <sub>5</sub>	m <sub>4</sub> 375	m <sub>3</sub> m <sub>5</sub>		
3.3	Not Displaced			m <sub>1</sub> m <sub>5+</sub>	m <sub>2</sub>	m <sub>1</sub> m <sub>5+</sub>	Prob C	
						m <sub>4</sub> 375		
						m <sub>2</sub>		

Table B

Figures in £0000

## Net Difference in Annual Costs &amp; Benefits Between University &amp; County Plan

Consumers				University Plan Minus County Plan			Net Advantage To	
Item No	Sector Reduction	Number		Benefit	Cost	Net		
		Cty	Univ					
4.2	Occupiers displaced	n	n+	£130	p <sub>5</sub> *p <sub>6</sub> +p <sub>7</sub> p <sub>5</sub> p <sub>6</sub> p <sub>7+</sub>	£130 p <sub>5</sub> +p <sub>6</sub> +p <sub>7</sub> p <sub>5</sub> p <sub>6</sub> p <sub>7+</sub>	N/C	
4.4	Occupiers not displaced			m <sub>18</sub> m <sub>16</sub>	m <sub>19</sub> m <sub>20</sub> m <sub>17</sub>	m <sub>18</sub> m <sub>16</sub> m <sub>19</sub> m <sub>20</sub> m <sub>17</sub>	Prob C	
2.02	New occupiers	n	n+	i <sub>2</sub> i <sub>1</sub>	m <sub>7</sub> m <sub>6</sub>	i <sub>2</sub> i <sub>1</sub> m <sub>7</sub> m <sub>6</sub>	U	
2.04	Vehicle users	n	n+		m <sub>9</sub> m <sub>10</sub> m <sub>9</sub> +m <sub>10+</sub>	m <sub>9</sub> m <sub>10</sub> m <sub>9</sub> +m <sub>10+</sub>	U	
2.06	Car Park Users	n	n+	i <sub>5</sub> +i <sub>5</sub>	m <sub>11</sub> +t <sub>1</sub> +t <sub>3</sub> m <sub>11</sub> t <sub>1</sub> t <sub>2</sub>	i <sub>5</sub> +i <sub>5</sub> m <sub>11</sub> +t <sub>1</sub> +t <sub>3</sub> m <sub>11</sub> t <sub>1</sub> t <sub>2</sub>	N/C	
2.08	University Faculty & Students	n	n	i <sub>6</sub> t <sub>3</sub> + i <sub>6</sub> +t <sub>3</sub>	i <sub>6</sub> t <sub>3</sub> + i <sub>6</sub> +t <sub>3</sub>	i <sub>6</sub> t <sub>3</sub> + i <sub>6</sub> +t <sub>3</sub>	N/C	
2.10	Shopping Public	300th	400th	i <sub>7</sub> +i <sub>7</sub>	t <sub>4</sub> i <sub>7</sub> -s <sub>7</sub> + t <sub>4</sub> i <sub>7</sub> + t <sub>6</sub> t <sub>7</sub>	i <sub>7</sub> +i <sub>7</sub> t <sub>4</sub> i <sub>7</sub> t <sub>6</sub> t <sub>7</sub>	Prob U	
2.12	Public at large	n	n	i <sub>8</sub> i <sub>9</sub> i <sub>11</sub> p <sub>1</sub> +p <sub>2</sub> p <sub>4</sub> i <sub>8</sub> +i <sub>9</sub> +i <sub>10</sub> p <sub>1</sub> p <sub>2</sub> +p <sub>4</sub>		i <sub>8</sub> i <sub>9</sub> i <sub>11</sub> p <sub>1</sub> +p <sub>2</sub> p <sub>4</sub> i <sub>8</sub> +i <sub>9</sub> +i <sub>10</sub> p <sub>1</sub> p <sub>2</sub> +p <sub>4</sub>	C	

## References

(1) William Holford and H. Myles Wright, Cambridge Planning Proposals, 2 vols. (Cambridge University Press, 1950)

(2) Nathaniel Lichfield, Economics of Planned Development (Estates Gazette, 1956) Chaps. 18-19; "Cost-Benefit Analysis in City Planning", Journal of American Institute of Planners, Vol. 26 (1960, p. 273) and Cost-Benefit Analysis in Urban Redevelopment, Research Report 20 (Berkeley : Real Estate Research Program, Institute of Business and Economic Research, University of California, 1962); "Cost-Benefit Analysis in Plan Evaluation", The Town Planning Review, Vol. 35 (1964, p. 159).

(3) Lichfield and Julius Margolis, "Cost-Benefit Analysis in Urban Government Decision Making" (1961) Ed. Howard G. Schaller, Public Expenditure Decisions in the Urban Community (Washington D. C. : Resources of the Future Inc., 1963)p. 118.

(4) Reference has been made to the following publications :-

1. William Holford and H. Myles Wright, op. cit.
2. County of Cambridge, Report - The First Review of the Town Map for Cambridge (Cambridge : County Planning Department, 1961).
3. County of Cambridge, County Development Plan, Comprehensive Development Area, Map No. 4, (Lion Yard, Cambridge) Report (Cambridge : County Planning Department, 1962).
4. Cambridgeshire County Council, Summary of the Plan and Planning Surveys for the First Review of the Town Map for Cambridge (Cambridge : The County Planning Department, 1962).
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7. R. Travers Morgan & Partners, Appreciation of the Cambridge Traffic Plan, Study Paper No. 1 (Cambridge : County Planning Department, 1963).
8. Derek Senior, A Guide to the Cambridge Plan, (Cambridge : County Planning Department, 1956).
9. Thomas Sharp, The Character of Cambridge, (Cambridge : County Planning Department, 1962).

(5) Reference has been made to the following publications :-

1. Cambridgeshire County Council, Cambridge Town Map - First Review Statements by the University of Cambridge on the Future Planning of the City of Cambridge, 1950-1961 (Cambridge : County Planning Department, 1962).
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3. The Shape of Cambridge - A Plan (Cambridge : The University of Cambridge Estate Management Advisory Service, 1962). Cambridge Daily News, Supplement, "The Planning Review", June 1, 1962.
4. J.F.Q. Switzer, "Urban Development - a new approach" Contemporary Problems of Land Ownerships (Cambridge : Department of Land Economy, 1964).

(6) For a general discussion see Tibor Scitovsky, Welfare and Competition (Richard Irwin, 1951) pp. 181-8; K.W. Kapp, The Social Costs of Private Enterprise (Harvard University Press, 1950), pp. 13 ff; Roland N. McKean, Efficiency in Government Through Systems Analysis (John Wiley and Sons, Inc., 1958) Chapter 8.

(7) An important omission from the table and analysis is the financial repercussions for the City and County Council as municipal as opposed to developing authorities, and for the Central Government which would bear part of the cost of roads by grants. The omission is both for reasons of space and also because the financial repercussions for these bodies have not entered into the controversy.

(8) Land acquisition costs were based on the compulsory purchase compensation code, which is roughly market value for real estate interests together with compensation for disturbance to trade, etc. Both land and construction costs include an allowance for professional fees and interest on capital during the development period.

(9) The annual cost in the public sector is taken at the annual annuity to repay the loan (interest plus redemption) over 80 years for land and 60 years for construction. The 8  $\frac{1}{2}\%$  in the private sector allows a profit and amortization element over borrowing rate.

(10) Theoretical points arise in the selection of each rate of interest; but these are not discussed here.

(11) The discounting in Tables 1 and 2 is by taking present worth at 6%, the effective date for each phase for both cost and revenue being 3 years after its commencement. This is crude, but of sufficient accuracy for the purpose.

(12) The discounted rate of return is calculated as present worth of revenue streams divided by present worth at capital cost streams.

(13) This distinction between costs and benefits of vehicle users differs from that usually adopted in the literature, where the costs are those of the highway authorities and the benefits are taken to be the saving in costs. For a discussion, see Herbert D. Mohring and Mitchell Harwitz, Highway Benefits : An Analytical Framework (North Western University Press, 1962, pp. 8-40).

(14) In particular Thomas Sharp, op. cit.; and J. F. Q. Switzer, op. cit.

(15) Thomas Sharp, op. cit.

(16) Traffic in towns. Reports of the Steering Group and Working Group appointed by the Minister of Transport (Buchanan Report) (London : H. M. S. O., 1963) P. 19 ff.

(17) For a more comprehensive attempt, see "Cost benefit analysis and accessibility and environment" in Traffic in Towns, op. cit., Appendix 2. The attempt was made by the writer in collaboration with D. H. Crompton.

(18) This assertion will take some swallowing, for each redevelopment project is fought bitterly by very many owners, despite the promise of compensation at market values. But the objections stem from all kinds of reasons - dislike of official action, hope for diversion onto other property, difficulty in selling that follows planning proposals. These are certainly costs, but they are assumed here to be compensated for in the acquisition price. In so far as they are not, the University Plan is less costly to landowners than the County Plan.

(19) These losses are very significant in practice, for forced relocation is resisted. See Chester Hartman, "The Housing of Relocated Families", Journal of American Institute of Planner (1964).

(20) See Roland N. McKean, op. cit.

(21) No firm study of this kind has yet been made, so that the figures are only provisional.

(22) The loss would still be £12m. even if the comparison is made from the date of the study (1963) or indeed any other date.

(23) Ministry of Works and Planning, Expert Committee on Compensation and Betterment, Final Report (London : H. M. S. O., 1942), pp. 14-16.

(24) For draft decision see County of Cambridge, County Planning Department, County of Cambridge Development Plan, First Review Cambridge Town Map and Comprehensive Development Area No. 4 (Lion Yard) Cambridge. Report on the modifications proposed by the Minister of Housing and Local Government (1964).

(25) Holford and Myles Wright, op. cit., Vol. 1, Para. 281-8.

(26) cf Lichfield, Cost Benefit Analysis in Urban Redevelopment, op. cit. p. 21.

